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CASEBOOK

OF

BIBHAS DE

THE ANTARCTIC ICE FOLLIES

THE GREAT BICEP2 TELESCOPE
DISCOVERY THAT WAS NOT

BICEP2 was a collaborative Harvard-Stanford-Caltech quack job that unfolded on the icy flats of Antarctica. When the author exposed this side-splitting quackery, the physics establishment – especially Princeton - moved in with all their might to whitewash over it. As always, the media pitched in to install the cover up. The instrumentation fault –affecting a range of active telescopes – was never admitted publicly.

PREFACE

If you wanted to think up a high theory, high tech, high math research project in physics that would have *National Geographic* appeal and would play well both in Peoria and with the commentariat, you could not do better than BICEP2 (before the advent of LIGO, that is.)

Indeed, when the discovery was rolled out, the finest of Hollywood stagecraft, Met choreography and Amundsen heroics were in evidence.

I too got swept up in this euphoria and decided to study the science out of sheer wonderment. It became instantly obvious that there was something amiss here, and I said that in my blog site right then. As I dug deeper, it became clear as daylight that the whole thing was based on abject quackery at the very root. People trained in astronomy were playing advance aerospace design engineers, without a clue as to what they were doing.

This would be good for some hearty laughter had it not been for the subsequent conduct of the physics establishment which moved in forcefully to cover up this blatant miscarriage of science. There was nothing laughable about this. It was the darkest, crookedest and most abhorrent conduct on the part of an intellectual collective. No one faced any accountability. The media assisted in this campaign of cover up.

This casebook is meant to be widely readable. It is composed of sections from my book *The Falsifiers of the Universe* and images from my blog *The Dreamheron Chronicles*. It is provided as an antidote to the clear and present evil today's physics establishment has become.

SECTION I
WHAT IS BICEP2?

Two of the most seminal predictions of Big bang Theory were the 3 k cosmic black body radiation, and the inflation era gravitational waves.

COBE Satellite verified the 3 K black body radiation on the sky with phenomenal exactitude.

BICEP2 was a ground-based telescope designed to verify the gravitational waves by mapping the polarization of the said radiation. This verification was made with phenomenal exactitude.

CHAPTER I-8
Inflation era and gravitational waves

Something else happened in the inflation era. Gravitation arose and its energy was released in the form of gravitational waves (also referred to as gravitation waves.) Their corresponding signature today is expected to be found in a certain mode of polarization of the 3 K blackbody relic radiation.

Thus inflation era gravitational waves – if they are detected in this radiation – would offer strong support to the idea of cosmological inflation.

There is a trend among the Big Bang cosmology community to spread the word that inflation really is not a part of Big Bang cosmology. The purpose of this assertion is that if inflation should somehow be disproved, Big Bang should still survive intact.

This is not true. Both ideas require the existence of the blackbody relic radiation to be proved in the first place.

Before we move on, some basic concepts need to be introduced here for the purpose of our later discussion of inflationary gravitational waves. These concepts concern the polarization of the 3 K relic radiation.

As we will discuss later, in 1964 Arno Penzias and Robert Wilson discovered Cosmic Microwave Background radiation (CMB) in the Universe. This radiation was adopted by Big Bang cosmologists as their theoretically predicted 3 K blackbody relic radiation.

Generally speaking, CMB is observed to be isotropic and unpolarized. This means that the CMB intensity is the same in every propagation direction, and CMB electric field has no preferred orientation in the sky.

However, this is not quite true. We know that CMB has a very faint patchy structure in the sky. And reportedly a very small portion of the CMB intensity is polarized.

For this polarized component of CMB intensity, the electric field of the electromagnetic wave has a specific directionality in the sky. That fractional intensity of CMB that is polarized and that directionality can be determined. Then a vector line segment can be drawn on the sky (as seen from the Earth) such that its length reflects the fractional intensity and its orientation reflects the orientation of the electric field in the sky. When

such line segments are plotted for many adjacent observation points in the sky, we obtain a CMB polarization skymap.

Such expected skymaps can be divided into two categories, as shown in Figure I-2. The first category called E-mode polarization is where the bars form closed loops or radial spokes. The second category called B-mode polarization is where the bars forms twisted patterns and do not close the loops.

The E-mode polarization is more or less conventional polarization. It can be produced by such processes as scattering of CMB from free electrons in space.

If the distribution of matter in the sky were perfectly homogeneous, any polarizations arising through the above processes would of course cancel out, and no net polarization would be observed. It is the patchy, inhomogeneous structure that causes net observable polarization to arise. Thus there appear polarization swirls approximately outlining the patchy structures at the scale of observation.

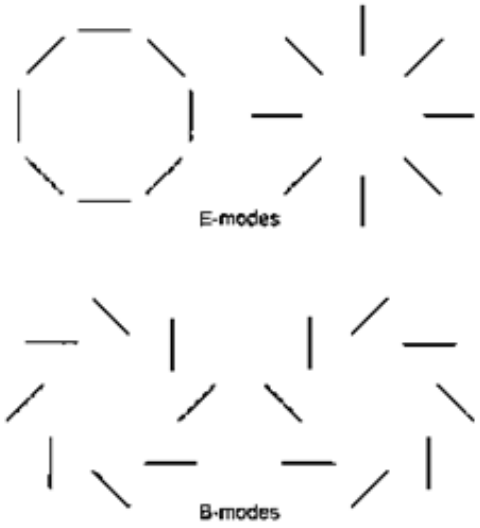


Figure I-2: E-mode and B-mode polarization swirls in the sky.

The B-mode polarization is very special. It can be produced only by gravitational waves, which also produces E-mode signals. However, the B-mode signals are thought to be much weaker than the E-mode signals, which themselves are many orders of magnitude smaller than the CMB signal.

In recent times it has been argued that B-mode polarization can also arise from non-gravitational E-mode polarization through certain processes. This made the source of B-mode polarization swirls ambiguous – not unique to primordial gravitational wave.

As an example, isotropic CMB radiation can be polarized by scattering from elongated dust grains in space. This E-mode polarization then can transform to B-mode polarization, and mimic the signature of gravitational waves.

So the point to remember is that the gravitational wave hunters would be looking for B-mode polarization patterns in the sky. If they find such patterns, they would then have to show that these did not arise from – wholly or substantially – a conversion of E-mode polarization from sources other than gravitational waves.

SECTION II
THE BICEP2 PROJECT

The BICEP2 team that was gathered was truly the A Team. Harvard, Stanford, Caltech, … – they were the crème de la crème. And they did not lose an opportunity to let you know this.

CHAPTER II-6
BICEP2 Collaboration

II-6.1 Introduction

With the discoveries of the relic blackbody and the patchy structure of the sky predicted by Big Bang theory well under their belt, the natural order of business for the Big Bang cosmologists now was to set out on the hunt for the B-mode polarization swirls in the sky. This would clinch both inflation theory and the theory of primordial gravitational waves.

This task fell on the next generation, the one following that of Smooth, Mather et al. A cadre of bright young astronomers rose to the task. A number of experiments designed to detect the very faint polarization swirls in the sky were begun. Of these, the one that came to fruition first was the so-called BICEP2 experiment, BICEP being an acronym for *Background Imaging of Cosmic Extragalactic Polarization.*

II-6.2 Provenance

BICEP2 Project was a part of a large, multi-center program designed to hunt down B-mode polarization swirls in the sky. A number of the ground-based projects were centered on telescopes located in the South Pole. The BICEP program involved a refractor telescope in the Amundsen-Scott South Pole Station. The main work took place in the 2010 – 2012 timeframe.

Initially, dual polarized horn antennas were used to populate the focal plane of the telescope as the feed horns to make an image of the sky. This was the BICEP1 telescope. It did not succeed in positively detecting B-mode polarization swirls. It was then decided to use a different type of focal plane imaging instrumentation: slot antennas machined on a planar circuit board – hundreds of them. The antennas were alternately at 90 degrees to one another to receive two orthogonal polarizations (Figure II-16). Upon pointing the telescope to a region of the sky, this region would be imaged on the plane of the antennas. The antenna elements would then analyze the signals to generate a polarization map of that region.

The initial design of this imaging plane by James Bock contained

crossed slot antennas – two slot antennas intersecting in an X configuration. This was found to not work well. At this point Chao-Lin Kuo took over the function of designing the imaging plane.

It was determined that the above design had two problems. First, the isolation between the two crossed slots was poor. Second, the lead lines to the antennas on the said circuit board were interfering with one another.

The BICEP2 team leaders: (*From left to right*) Clement Pryke, James Bock, Chao-Lin Kuo, and John Kovac.

After trying various solutions to these problems, Kuo settled on the design shown in Figure II-17(b). The antennas were now placed in an H configuration to eliminate the poor isolation problem. Some 500 such antennas were packed onto the imaging plane, compared to some 50 horn antennas of BICEP1. Each BICEP2 antenna was coupled to a highly sensitive bolometric detector that converted the electromagnetic energy to heat and measured the amount of heat. Also, the lead lines were strategically rerouted so as not to interfere with one another.

Chao-Lin Kuo then determined that in order to detect the B-mode polarization swirls in the sky, the instrument needed to have the ability to detect signals that are one part in 30 million compared to his main signal – the blackbody spectrum. By cooling parts of his instrumentation to cryogenic temperatures, he satisfied himself that this level of sensitivity was achievable.

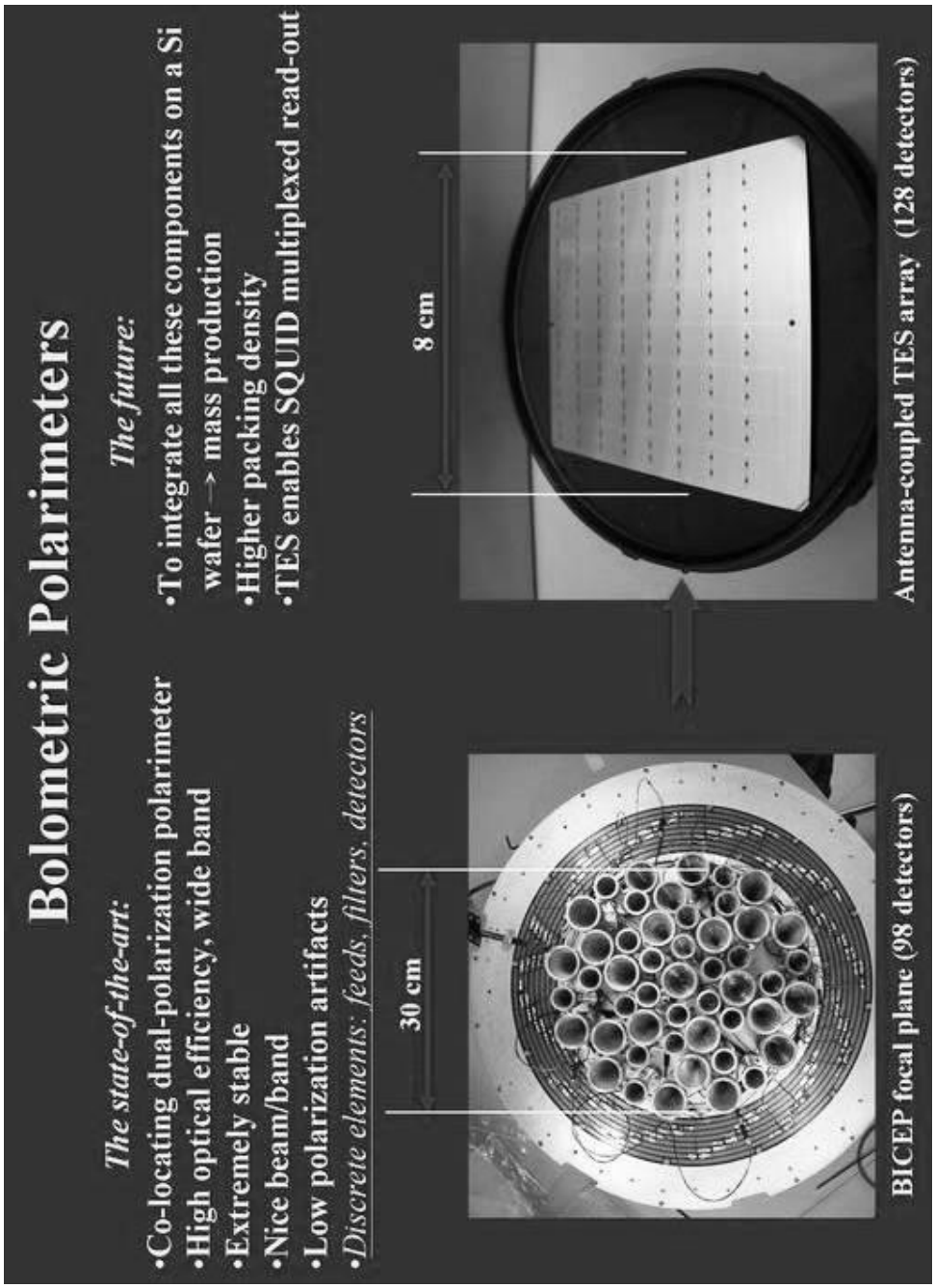


Figure II-16: An early diagram explaining the transition from the BICEP1 Telescope to the BICEP2 Telescope. Dual polarized horn antennas (two detectors per horn) were replaced by slot antennas (one detector per slot) on a printed circuit board.

[TES = Transition-edge Sensor (detector element); SQUID = Superconducting Quantum Interference Device (detector)]

(Image: Stanford.edu)

II-6.3 The telescope

Figure II-17(a) shows their telescope. It was a small aperture (26 cm diameter) telescope with a corresponding focal plane area. The frequency of operation of BICEP2 was 150 GHz (wavelength 2 mm), right near the peak of the 2.7 K relic blackbody spectrum. BICEP2 looked at a portion of the sky almost directly above the South Pole. This area of the sky was believed to be relatively "clean" – i.e., free of galactic dust. Thus any contaminating polarization signal from the dust would be minimized.

The data from this telescope were gathered over a long period of time – covering a number of South Pole observing seasons. While taking data, various tests were done to ensure that the measurements were true sky measurements, and not artifacts. After the data were acquired, various types of processing were done for the same purpose.

II-6.4 Success

At the end of all these efforts the BICEP2 team finally prepared to report the results. A Press Conference was set at Harvard University for 17 March 2014. It promised the disclosure of an important discovery. While the exact nature of the discovery was kept secret, people guessed that this would be about primordial gravitational waves. Great atmospherics were thus created and palpable anticipation was seeded, leading up to the Press Conference. The Conference was accompanied with great stagecraft, the BICEP2 leaders all wearing some type of uniform. A barrage of TV cameras pointed at them.

The team did not disappoint. They unveiled nothing less than picture perfect B-mode polarization swirls in the sky. A statistical certainty of 99.9997% of the discovery being correct was reported, reminiscent of the similar mind-boggling accuracy of 50 parts per million with the COBE satellite discovery of the relic blackbody spectrum. To appreciate the scientific enormity of this achievement, one should note that the polarization signals being measured in the sky here were probably a million times smaller than the signals reportedly measured by COBE.

The scientific establishment and the media went into a tizzy, trying to out-bloviate each other. It seemed that there were not enough

superlatives in the English language to describe such an achievement by mere mortals. The evening newscasts around the globe capped this day of celebration.

However, the euphoria did not last long. Scientific groups from great centers of research such as Princeton University and Oxford University pointed out that these results could be explained in their entirety as polarization of CMB produced by galactic dust. Rather than being the deep background CMB polarization signal, the BICEP2 results may be showing the foreground dust polarization signal. The person that emerged as the leader of this dissidence movement is David Spergel of Princeton University.

So there was here no observation of gravitational waves and no confirmation of inflation. The rival teams made calculations to prove their point, and the Planck Collaboration contributed analysis of Planck satellite data to bolster this view. The BICEP2 team initially resisted this criticism vehemently, but eventually softened their stance.

After some back and forth debate, it was generally concluded by all parties concerned that the BICEP2 team had indeed discovered B-mode polarization in the sky, a great achievement in itself; but that no gravitational waves were discovered nor was inflation proven.

Figure II-17: The BICEP2 instrument.

The BICEP2 paper was eventually published in the journal *Physical Review Letter* in June 2014. The authors softened their stance that they had discovered gravitational waves, and allowed for the possibility that the entire B-mode signal was due to dust.

The leaders of the scientific establishment now moved in powerfully to blunt the blow on the BICEP2 team. They issued lofty homilies such as *This is how science is done* and *This is how science progresses*. The whole business was given a spin as science's Business as usual – and a very healthy business at that. The BICEP2 Team was saved harmless.

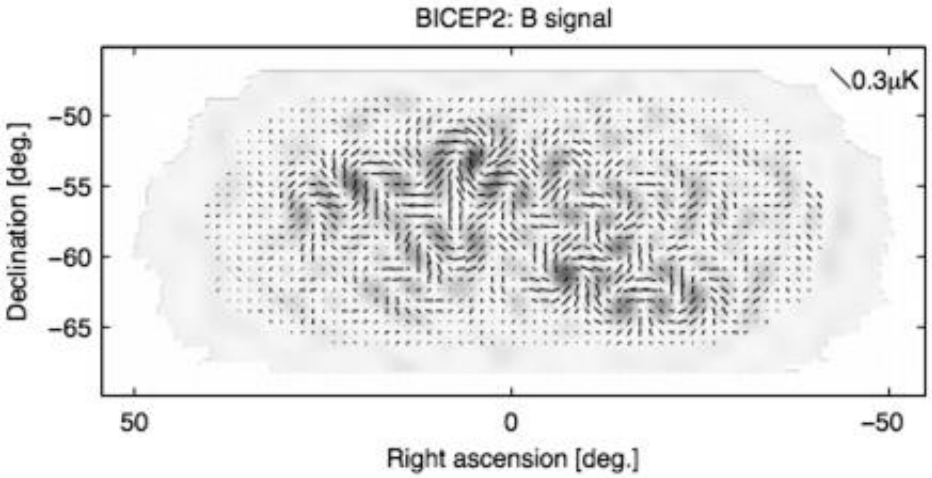


Figure II-18: Typical B-mode polarization swirls in the sky reported by BICEP2 Collaboration.

THE GLORY DAYS

It is a natural and healthy emotion for scientific discoverers to rejoice. But there was nothing natural about the rejoicing that followed the BICEP2 discovery. The announcement of the discovery was a highly planned Hollywoodesque media affair. But even before that festive occasion, stories surrounding the discovery were being *scripted* and *created*. As far as the selling of the discovery is concerned, nothing was left to nature or to chance.

Chao-Lin Kuo, video cameraman in tow, appears at the Stanford home of Andrei Linde, unannounced. Kuo springs the news of the fantastic discovery to the Lindes. After the surprise news is assimilated by the Lindes, champagne corks pop.

Eureka! Assistant Professor Chao-Lin Kuo surprises Professor Andrei Linde with evidence that supports cosmic inflation theory.

Once the surprise has sunk in, the pair celebrate the 'spectacular' discovery with champagne.

Now, Andrei Linde – with the newfound knowledge that he is a brand new discoverer of the greatest secret of the Universe - is overcome with great emotion, and goes all verklempt.

Meanwhile, over on the East Coast, BICEP2 theorist Alan Guth got busy readying himself for the Nobel Prize. He had a wood-and-glass showcase custom-built in blonde wood to house his Nobel medal. It is positioned just outside his office in MIT.

Alan Guth: Waiting for the Big Bang

Three decades ago, the innovative physicist had a eureka moment that explained the universe.

By **Dan Vergano**, National Geographic
Photographs by **Deanne Fitzmaurice**

PUBLISHED JUNE 30, 2014

At the end of a quiet, carpeted hallway in MIT's physics department, a display case stands empty outside the office of physicist Alan Guth.

Framed in blond wood and clear glass, the empty cube waits for the world to fill nothing with something.

"It would be nice if it happens," says Guth, a rumpled 67-year-old, who sits in his respectably cluttered office, sunlight brightening piles of papers scattered over a desk and table.

In due course, the Harvard President pitches in, with the distinguished vocabulary befitting a University leader.

HARVARD PRESIDENT PITCHES BOGUS DISCOVERY OF COSMIC INFLATION

Harvard University President Drew Gilpin Faust

"This March, they gathered at the Harvard Center for Astrophysics and shared their breakthrough discovery with the world, expanding our knowledge of the universe's very beginnings and reminding the world of the wonder of discovery, memorably described by Professor Kovac as a "mixture of awe and elation."

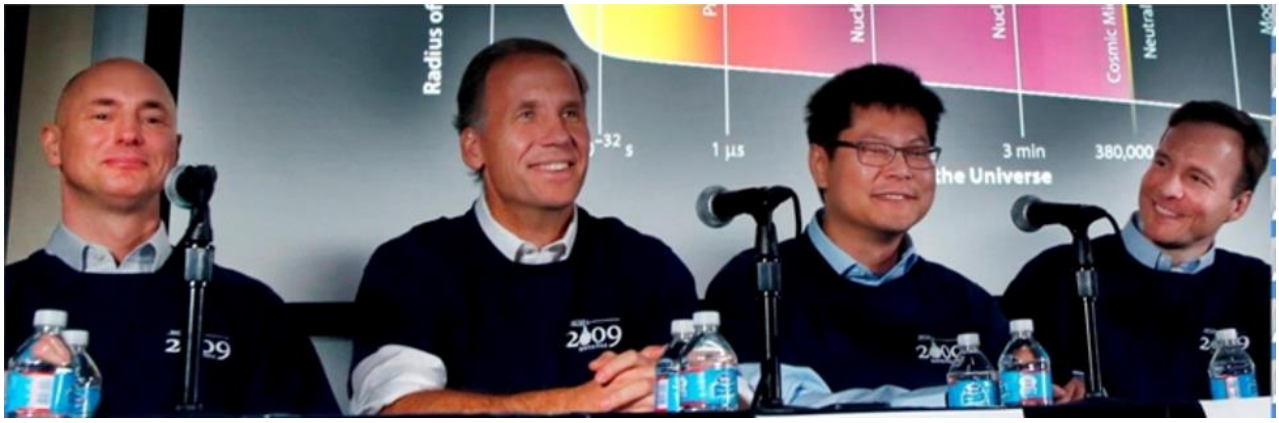
....

"At a moment filled with opportunities, the nation seems to be reconsidering the merits of supporting science; we will feel the deleterious effects of budget cuts for generations. Imagine if the National Science Foundation had not helped fund the construction of the telescopes used by Professor Kovac and his colleagues, ..."

- "The Region of Ideas and Invention", Harvard Magazine, May-June 2014

A world education message from www.bibhasde.com 04/12/14

The BICEP2 Press Conference was an inspirational sight to behold. Be sure to note the harmonious couture and uniform physiognomy.



SECTION III
BICEP2 WAS A QUACK JOB

A high-end butcher can take out a calf brain with great finesse. When it is finally plated for you, it retains its shape. But would you let him perform a frontal lobotomy on yourself or ones close to you?

The BICEP2 folks were mostly trained in astronomy and astrophysics. The design of the telescope called for a range of experise best found in high-tech engineering companies. Not only was specialized expertise needed but also experience was the key.

The young BICEP2 leaders fancied that they themselves were the right people to do this. Not only that. They bragged about it and said they could teach the commercial engineering companies a thing or two.

The result was what it was. The butcher performed the lobotomy!

Incidentally, this is a repeat of what went down a few years before with the COBE Satellite design.

CHAPTER IV-6
The BICEP2 botch-up

IV-6.1 What the BICEP2 project is really about

Everyone familiar with the BICEP2 Project knows that it is directed at studying the signature of the inflation era in the form of B-mode polarization swirls in the sky, created by gravitational waves produced in that era. These swirls are expected to be seen in the Cosmic Microwave Background (CMB) radiation.

Nobody familiar with the project talks anymore about the 2.7 K Big Bang blackbody radiation, which is what the BICEP2 project is really about. It is about looking for the swirls predicted to be imprinted on the said blackbody. It is about looking for something in the sky that has repeatedly been proved to be not there in the sky. BICEP2 is very much a blackbody project, like COBE, WMAP and Planck satellites.

But CMB is not that blackbody. Thus, even to begin with and even at the level of inception, BICEP2 is a misguided venture. It should never have got started, just as COBE-FIRAS should never have got started. The BICEP2 project not only got started, but quickly proliferated. Teams upon teams descended on the scene the way they do when the deer-hunting season opens.

IV-6.2 Aperture fault: Misunderstanding of telescope science

BICEP2 is a refractor telescope for microwave radiation, directed at observing the polarization characteristics of the CMB at 150 GHz (wavelength 2 mm.) It has an aperture diameter of 26 cm. Its focal plane is populated by a large number (~ 500) of small (physically and electrically) antennas with wide beams. The linearly polarized slot antennas are alternately at 90 degrees to one another to receive two orthogonal polarizations.

The aperture of the BICEP2 telescope has two fatal design faults stemming from:

A. MISUNDERSTANDINGS (of telescope science);

B. MISINFORMATION (about the amount of CMB power available in the sky.)

Personally, I would not have gone with refractor optics for millimeter wave astronomy. But this is not a criticism. The following is: While I have not sensed any consternation in the scientific establishment over this, I myself was most baffled that such a small diameter (about the diameter of a standard dinner plate) telescope could not only receive healthy signal from the dilute CMB radiation, but also produce high resolution maps of features buried deep in a very minute fraction of this radiation.

Remember that the scientists and engineers in the past went to larger and larger collecting aperture from COBE to WMAP to Planck satellites – all directed at observing CMB and at mapping features in very small components of it. The COBE-FIRAS instrument – though not directed at imaging – had a collecting area comparable to BICEP2, and was a total failure. The design of the BICEP2 telescope went in the face of all these.

However, the BICEP2 team seems to be aware of this unconventional aspect, and has offered the following scientific justification for the "novel" use of small aperture:

Small telescopes have an overlooked capability to gather a lot of light with a wide field of view. … it was a novel approach in CMB measurements and gave us an enormous 20 degree field of view. In fact the light gathering power of BICEP is not so different from that of the 10-meter telescope looming over us at the South Pole, but BICEP's aperture is just 26 centimeters.

While it is not spelled out, this comment refers to an isotropic radiation field (which is what CMB is) where the spectral radiation flux F_ν (watts per sq. meter, say, integrated over the telescope bandwidth) is the same in all directions. Let

d = diameter of BICEP2 telescope (= 26 cm);
D = diameter of 10-meter South Pole telescope (=1000 cm);
$A_{bicep2} = \pi\, d^2/4$, aperture of BICEP2 telescope;
$A_{sp} = \pi\, D^2/4$, aperture of South Pole telescope.

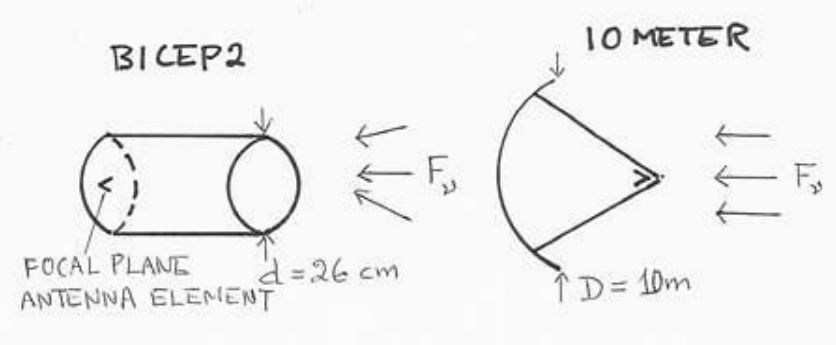


Figure IV-21: Comparison of small aperture and large aperture telescopes in terms of the capability of mapping the sky.

Referring to Figure IV-21, we see that for BICEP2 telescope, radiation enters the antenna aperture from all directions within its 20-degree field of view. For the narrow beam South Pole telescope, radiation enters only in the direction parallel to the telescope axis. This is how it is possible for the same amount of radiation (watts) to *enter the aperture* of a small telescope and a large telescope. To this extent, the statement from the BICEP2 team is correct. But this comparison is irrelevant.

What is relevant is how much radiation P (watts) is received by a single focal plane antenna element. This amount is

$P_{bicep2} = F_\nu A_{bicep2}$

$P_{sp} = F_\nu A_{sp}$

$P_{sp} / P_{bicep2} \sim 1500.$

So everything is in order. An antenna element at the focal plane of a small telescope receives little power, and the same at the focal plane of a large telescope receives great power. This is true in a directed radiation field or an isotropic radiation field. There is no novel way to defeat this basic physics.

The above comments pertain to the *design* of BICEP2 telescope. Is there any *observational affirmation* that the design is defective? It should be noted that Planck satellite, with vastly larger aperture than BICEP2, reports low power levels difficult to process in the region of the sky that BICEP2 mapped with such clarity. This should rightly be accepted as the observational evidence that BICEP2 telescope results do not pertain to CMB.

IV-6.3 Aperture fault: Misinformation

To design a telescope aperture for an application, one needs a design value for the energy flux available for that application. In this case it is the CMB flux F_v in the sky.

It is a matter of record that BICEP2 telescope was designed for a value of F_v corresponding to the ~ 3 K cosmic blackbody discovered by the COBE satellite (Table IV-3).

However, it is an open secret within the cognoscenti that this blackbody does not exist in the sky and that the actual value of F_v may be as much as two orders of magnitude lower. This information has been available to the BICEP2 team for many years. But the academics have such an inflated collective ego that they would rather design wrong experiments and report wrong results than to acknowledge that a grave science fraud was committed with their COBE discovery.

TABLE 1
MODELED DETECTOR LOADING FROM ELEMENTS IN THE OPTICAL PATH

Element	T_e [K]	Emissivity	Loading [pW]	T_{RJ} [K]
CMB	3	1.00	0.12	
Atmosphere	230	0.03	2.0	
Upper Forebaffle	230	1.00	0.65	
Window	230	0.02	1.0	
IR Blocker 1	100	0.02	0.45	
IR Blocker 2	40	0.02	0.18	
IR Blocker 3	6	0.02	0.01	
Lenses	6	0.10	0.07	
Total			4.5	21

Harvard University

Table IV-3: BICEP2 Collaboration's estimate of signals from various sources. The CMB is taken to be a 3 K blackbody, contributing 0.12 picowatt to the overall power budget. In reality this signal may be 10-100 times smaller, and so much smaller than all the other masking sources – by the BICEP2 team's own reckoning.

The above two faults in BICEP2 design constitute more than enough reason to retract the BICEP2 discovery. However, in the following section I will discuss the BICEP2 imaging technique and associated faults for good measure. I will describe how a modern high precision multi-million dollar scientific instrument is periodically given a whirl the way Buddhist prayer wheels are periodically given a whirl.

IV-6.4 Focal plane fault

Refer to Figures IV-22 and IV-23 illustrating the BICEP2 telescope optics and imaging technique. The BICEP2 focal plane is populated with a two-dimensional array of slot antennas cut in a metal plane, in a rectangular grid arrangement. There are 512 such slots in the focal plane, and an equal number of detectors. The slots are alternately “horizontal” (parallel to the x axis, say) and “vertical” (parallel to the y axis) – to receive two orthogonal polarizations.

Figure IV-22 shows details of a portion of the BICEP2 focal plane, looking up at it from the bottom. You can see the horizontal and the vertical slots and the associated microstrip circuitry (connecting the antennas to the detector components - not shown.) While the slots and the circuitry are separated by a dielectric layer, it seems to be transparent, thus allowing a simultaneous view of both.

The horizontal slots receive vertically polarized radiation and the vertical slots receive horizontally polarized radiation.

Consider two nearby antennas that are orthogonal to each other. They look at nearly the same spot in the sky and receive the same sky polarization.

If the horizontal antenna detects maximum power and the vertical antenna detects zero power, the incident sky polarization is vertical.

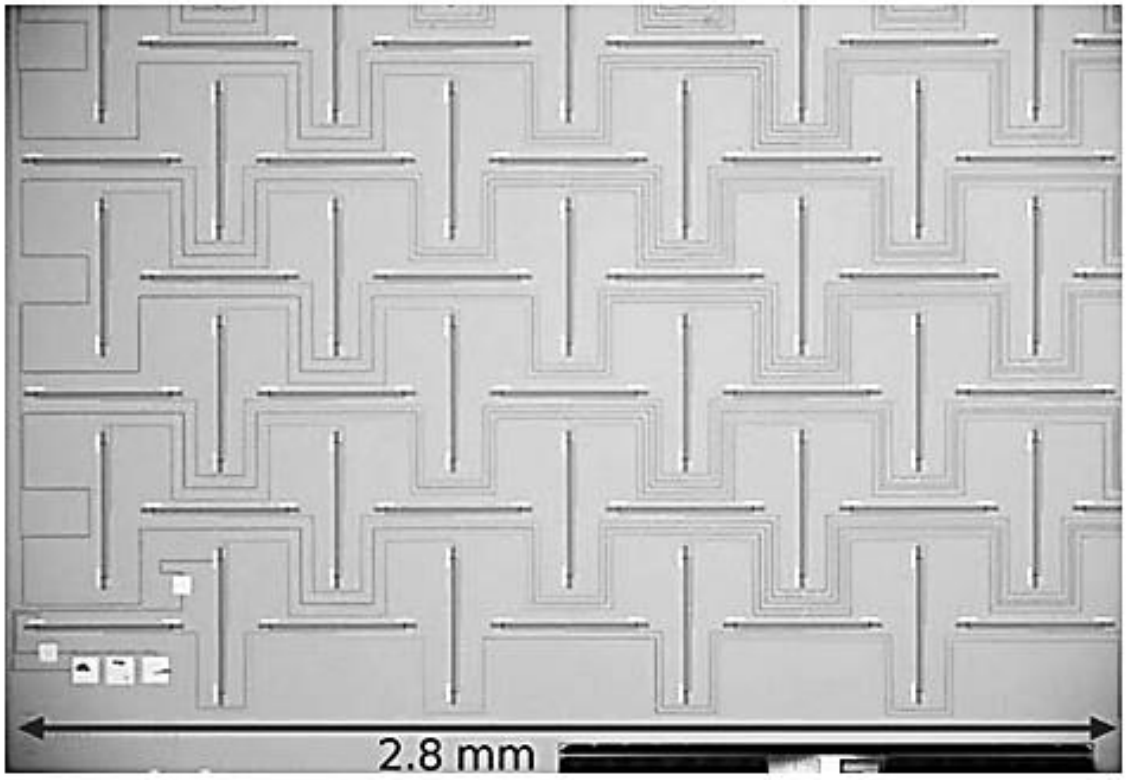
If the horizontal antenna detects zero power and the vertical antenna detects maximum power, the incident sky polarization is horizontal.

If both antennas detect the same power, the incident sky polarization is at 45 degree angle (or 135 degree angle). Or the sky radiation is unpolarized (randomly polarized.)

When the two antennas record different amounts of nonzero power

and the fraction of polarized intensity is known, the sky polarization angle can be calculated.

Any ambiguity in the angle is resolved by adding other information and coordinating across the entire imaging plane. Note that the antennas divide the total incoming radiation into horizontal and vertical polarization. The intrinsic polarization BICEP2 is searching for is over and above these polarizations.



(a) A portion of the BICEP2 focal plane slot antenna array

(b) A portion of the above array within a circle of radius equal to λ/3 about the center X (λ= the wavelength = 2 mm)

Figure IV-22: The spacing of the slot antennas in the imaging plane array.

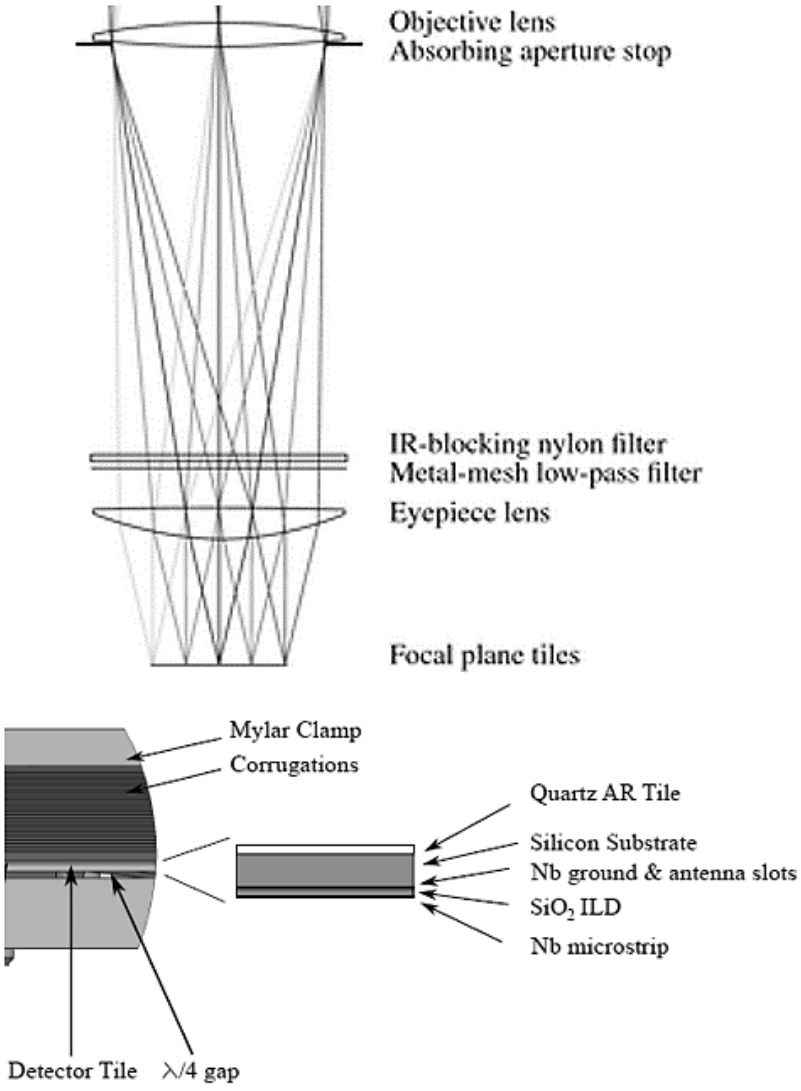


Figure IV-23: *Top* – BICEP2 telescope ray optics showing how families of rays arriving at different angles are brought to different points in the focal (imaging) plane. *Bottom* – The framing around the imaging plane, and an expanded view of the imaging plane layers. (*Image source: BICEP2 Collaboration.*)

This is the very basic principle of BICEP2 polarimetry we need to know for our discussion. Of course the practice is far more complicated. The main points for our purpose are:

1. Each location *a* in the focal plane corresponds to a location *A* in the sky. If *a* moves, *A* moves.
2. The antennas must be identical in their electromagnetic

properties. What this means for our specific purpose is that for the same amount of co-polarized power incident on an antenna, each antenna must report exactly the same amount of energy. When I say exactly, I mean there is very little tolerance, probably only a small fraction of 1%.

Note that BICEP2 telescope can be rotated about its axis. The imaging plane is rigidly fixed to the body of the telescope so that it rotates with the telescope.

Refer now to Figure IV-23. Above the metal plane containing the slot antennas is a seemingly fairly thick (not negligible compared to a wavelength) layer of dielectric (silicon) having a dielectric constant $\epsilon \sim 11.8$. It is actually the substrate for the metal plane. (In conventional usage the substrate would be at the bottom and the bare antenna metal plane on top.)

This is a problem. The substrate – if it was to face the incoming radiation - should have been a thin layer of low dielectric constant (~1) material. The silicon layer strongly bends the incoming rays that arrive from off-vertical directions in a way that has not been figured into the telescope optics. Note that the refractive index of this dielectric layer is high ($n = \sqrt{\epsilon} = 3.44$). This bending has the effect of diverting rays off their destination slot. So what would be the point of spending millions of dollars and spinning all this rigmarole to collect the faintest of faint radiation, only to waste some of it at the focal plane?

There is another problem. There is a quarter-wave anti-reflection (AR) quartz layer on top of this substrate for reducing reflection at the air/silicon interface. Such a layer affects off-vertical rays in a way that has not been included in the analysis.

There is also a quarter-wave layer at the bottom of the microstrip layer. If these quarter-wave layers have been placed in the near field of the antennas, then this is an inappropriate procedure. The near field is a non-propagation region where the wavelength has no clear meaning.

IV-6.5 Antenna fault

A discussion of antenna fault should best begin by reminding the reader what was being asked of the antenna. The design goal was to achieve 1 part in 30 million sensitivity in measuring the power incident on the telescope, and a determination of the polarization vector accurate enough to show the coherent polarization swirls in the sky.

The first antenna fault is the size of the slots. The length of a slot appears to be about 0.4 mm, judging from the pictures. Since the wavelength is 2 mm, we have an antenna of size $\lambda/5$. Technically, this not quite an *electrically small antenna* (for which the size is $\leq \lambda/10$.) And yet its performance has begun to degrade towards the properties of such an antenna and away from those of full size antennas (e.g., a length $\geq \sim \lambda/2$.) This antenna therefore has degraded polarization characteristics.

The above discussion is next complicated by the presence of the high dielectric substrate. The effective wavelength λ_{eff} in the substrate is smaller than the free space wavelength λ ($\lambda_{eff} = \lambda / \sqrt{\epsilon}$). One might thus think that one is dealing with an electrically full size antenna. But this is not the case, and a discussion of this becomes rapidly complex. Suffice it to say that such antennas have not been widely studied, and should not have been included in a scientifically characterizable system.

Secondly, the design of a slot antenna requires that the microstrip transmission lines (whether used for radiofrequency transmission or simply detected voltage) on the circuit board stay clear of the physical slot to some distance around it – as shown in the case of the vertical antennas. However, this principle was not followed for the horizontal antennas.

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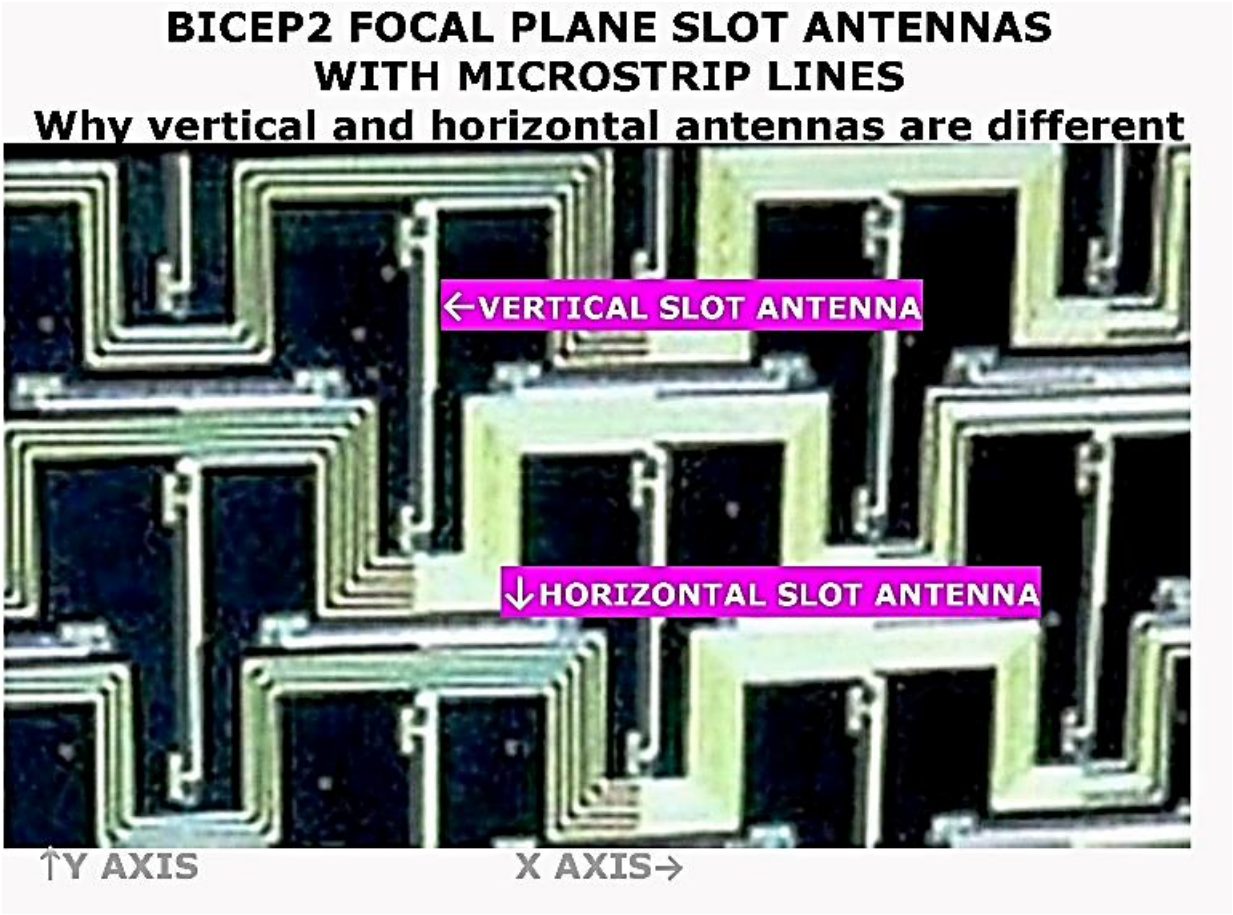


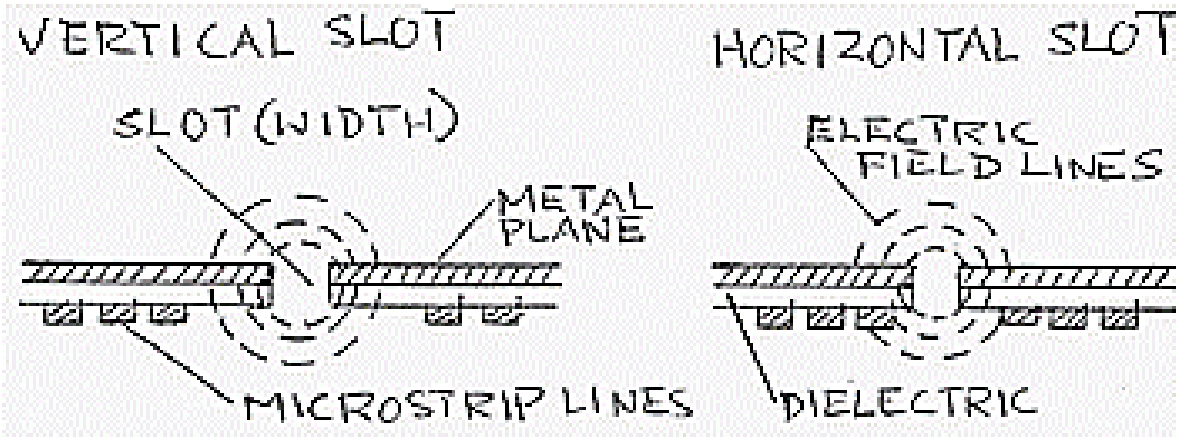


Figure IV-24: *Top* – BICEP2 imaging plane slot antennas and microstrip lines to the antennas. *Bottom* – Vertical sections of the plane showing construction of the slot antennas and the microstrip line layout next to the antennas. The silicon dioxide interlayer dielectric serves to insulate the metal plane from the microstrip lines. In antenna design practice it is forbidden for the stripline to encroach this close into the active region of the antennas.

As a result, the properties of the horizontal and the vertical antennas are different (Figure IV-24). They will report different amounts of power when the same amount of co-polarized power is incident on them. As I have explained, such a difference translates to a false polarization angle ascribed to the incoming sky wave.

Thus an intrinsic instrumental polarization is introduced at all circuit board locations *a*, and are falsely ascribed to all corresponding sky points *A* being observed.

Furthermore, the said difference in the power varies across the plane because of the way the circuit has been designed.

So the instrumental polarization has an entire polarization map (mosaic) of itself. If there is any native polarization in the sky, the map BICEP2 obtains is some kind of convolution of the instrumental polarization map and the sky polarization map

If the focal plane (i.e., the telescope) is rotated about the telescope axis, the location of *a* in the telescope changes with respect to the sky. And so the location *A* in the sky changes. Thus the *instrumental* map of the sky rotates with the telescope while the sky polarization map remains fixed in the sky.

Therefore, when the telescope is rotated, the sky image reported by BICEP2 structurally rotates. This would be the most crucial test to conduct with the BICEP2 telescope before any observations are made.

This was never done, indicating clearly that the designers were not even aware of these fundamental scientific issues.

Remember that BICEP2 was looking for the smallest of small signals. There needed to be not even an appearance that the horizontal and the vertical antennas are different. Instead, we have this clear design violation.

To summarize the discussion thus far:

1. Given the sensitivity required of the instrument, the horizontal and the vertical antennas are not the same in terms of their overall

Gain and radiation patterns.

2. Because the antennas are much smaller than a wavelength and as such not well characterized, they are unsuitable as components in a precision scientific measurement instrument.

3. The incident polarization angle will be rotated by the instrument because of the dissimilarity between the adjacent horizontal and vertical antennas.

4. Because of the layout of the microstrip circuitry, the focal plane has a clear directionality, the x and the y axis being not interchangeable.

5. The focal plane properties become convoluted with any actual skymap the telescope is observing, to provide an artifactual skymap.

In many popular discussions of the BICEP2 telescope, I have seen comments confusing antennas and detectors. It is said that the telescope is so phenomenal because it has so many detectors in the imaging plane, each detector being of high quality. The quality of imaging is determined by the antennas. They determine the optics. If this is not done right, it is immaterial what the detector quality is and how many detectors there are.

This confusion is also evident in invoking digital camera analogies (pixels etc.) to the BICEP2 class telescopes. The researchers frequently mix up optical and microwave concepts. Devices that are at odds have been slapped together willy-nilly.

Statements were made that the metal plane in which the antenna slots are cut shields the microstrip circuitry from the incoming electromagnetic wave. As I have shown in Figure IV-24, this simply cannot be the case.

IV-6.6 Polarization fault

In Section III-1.8 I discussed polarization pattern and axial ratio of a linearly polarized antenna. These determine how well polarized an antenna is. The higher the axial ratio, the greater the degree of linear polarization.

For the BICEP2 antenna elements, these test data for the telescope-mounted individual slot antenna have not been presented. But one can estimate that for this application the axial ratio has to be better than ~ 40 dB. The actual axial ratio of a BICEP2 antenna element is probably around 20 dB, and certainly no better than ~ 30 dB. With this axial ratio it would be impossible to detect and map the B-mode polarization swirls in CMB that have been reported.

IV-6.7 Array fault

Let us now turn to the antenna array, a portion of which is shown in Figure IV-22(a). The progress of the BICEP2 class telescopes has been driven by packing more and more antenna elements into the same focal plane area, reportedly to provide higher and higher resolution and faster and faster imaging of the sky.

In Figure IV-22(b) is shown one slot antenna of the array (marked by an x) with a circle drawn around it. The radius of this circle is $\lambda/3$ (λ= the wavelength, in this case 2 mm). Now we can discuss the situation from the point of view of basic physics and then, almost equivalently, from the point of view of antenna theory.

The physics view: One of the fundamental limitations of Electromagnetic Theory is that electromagnetic waves cannot resolve (discern, discriminate) structures that are closer than ~ $\lambda/3$.

What this means in the present context is that to the incoming wave, the central antenna and any other antenna within the circle in Figure IV-22(b) are indistinguishable. The wave sees the whole circle as one blurred area. Therefore the theory that each slot in the imaging plane (or a group of slots) distinctly images a single area of the sky is emphatically wrong.

Packing the slots closer and closer does not lead to greater and greater definition of the sky after a certain separation distance between the neighboring antennas has been reached. Yet, from many statements in evidence, this is what the BICEP2 Collaboration thinks to be the case.

The antenna theory view: From the point of antenna theory the circle represents the near field of the central antenna. Therefore the antennas within the circle are not independent of one another. When they needed each to be strictly isolated, there is instead cross-talk among them by virtue of bad design. Hence they are neither suitable for imaging nor for polarization measurement.

The principle of BICEP2 operation requires first and foremost that each antenna be independent of its neighboring antennas, that it have a high isolation. In actuality, the antennas in the entire imaging plane are interconnected through interference between contiguous regions such as shown in Figure IV-22(b).

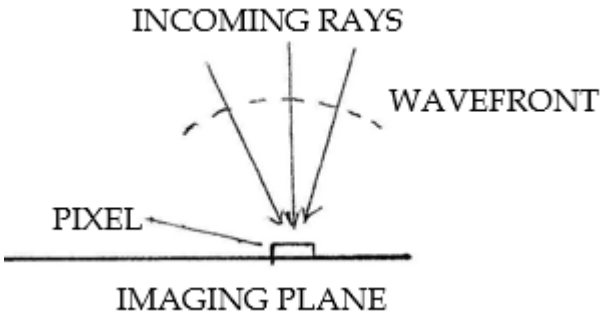


Figure V-25: BICEP2 used the planar wavefront phased array concept whereas the actual wavefront is spherical (cf. Figure IV-23).

Furthermore, the planar antenna array theory used in BICEP2 design is inapplicable. The array theory used assumes a plane wave (equal phase front) incident on the array at some angle to the forward direction. This is not the case with BICEP2, where the incoming wave has a spherical-like wavefront (Figure V-25).

I have come across a paper which spells out how the antenna spacing was arrived at (see Figure IV-26 which is self-explanatory.) It mistakenly uses a value of 11.8 for ϵ_r when the correct value to be used is 1.0. So the mystery of how principles of physics and antenna engineering were violated by a large factor is solved.

A physicist here can use common-sense to see how odd this

calculation is. If the silicon dielectric layer over the antenna slots (refer back to Figure IV-23) restricts the antenna spacing so drastically, then Equation (1) of Figure IV-26 should include the thickness of this layer as a parameter. Or this thickness must be much greater than the wavelength. So even on a cursory look this calculation is wrong. And yet, today in the spring of 2015, this is the operating principle of a number of telescopes, out there in the field trying to make grand discoveries.

3.1. *Antenna Design*

The antenna slots in each detector must be spaced to Nyquist sample the focal plane surface to avoid grating lobes that would rapidly change the impedance with frequency (Kuo et al. 2008). The antenna pattern of each axis of an array is calculated from the N elements per linear dimension spaced at distance s as follows:

$$A(\theta) = \sum_{m=-(N-1)/2}^{(N-1)/2} e^{-j2\pi \frac{m\, s\sqrt{\epsilon_r}}{\lambda_o}\sin(\theta)} = \frac{\sin(N\pi s\sqrt{\epsilon_r}\sin\theta/\lambda_o)}{\sin(\pi s\sqrt{\epsilon_r}\sin\theta/\lambda_o)}, \quad (1)$$

where λ_o is the free-space wavelength, ϵ_r the relative permittivity of the surrounding medium, and the sum is across sub-antennas indexed by m. In addition to the strong peak in the normal direction ($\theta = 0$), there are grating lobe peaks when $\sqrt{\epsilon_r}s\sin(\theta)/\lambda_o$ is a positive integer. To avoid these lobes, the slot spacing must be

$$s \leq \frac{\lambda_{o,\min}}{\sqrt{\epsilon_r}}\left(1 - \frac{1}{N}\right), \quad (2)$$

where $\lambda_{o,\min}$ is the minimum wavelength of operation and the term in parentheses accounts for the finite width of the grating-lobe peaks. For the 150 GHz detectors fabricated on silicon ($\epsilon_r = 11.8$) with an upper band edge of 180 GHz ($\lambda_{o,\min} = 1.7$ mm), the spacing must satisfy $s \leq 460\ \mu$m. To

http://arxiv.org/pdf/1502.00596.pdf

Figure IV-26: BICEP2 team's calculation showing how the BICEP2 antenna spacing was arrived at.

IV-6.8 BICEP2 observation technique

It is clear that the BICEP2 team was not even aware of the issues I have discussed above. They have in fact bandied around images of the focal plane all over the place with great parental pride. These images contained clear visual signal of what was wrong.

However, it seems that they concluded that some type of attention needed to be given to the angular position of the telescope about its axis. This is how BICEP2 team leader James Bock of California Institute of Technology described this:

To make accurate measurements over a wide area, the challenge is to control false signals. … Finally, to remove from the system any effects that might arise from having a preferred direction, we spin our telescope around its axis every day.

So it seems that some type of angle-averaging or angle randomization with regard to some unknown suspected directionality in the telescope imaging plane underlies the BICEP2 sky maps unveiled.

This is most curious in a state-of-the-art, pioneering experiment attempting to make the grandest of discoveries by pushing the limits of measurability.

If there is a suspected directionality, would one not want to examine and pinpoint this? Especially when it takes no more effort than making sky images with the telescope fixed at 0, 45 and 90 degrees position (for example.)

What does it mean exactly to average maps if they were structurally rotating?

The BICEP2 team had the burden to produce those angle-specific skymaps before publishing their discovery. This crucial burden on the BICEP2 experimenters cannot be avoided with statements like *We compared BICEP2 with other telescopes and everything is fine*; *We are very careful scientists*; *We have worked very hard for years;* and *B-mode polarization is on the sky.*

Where the instrument on the ground is clearly at fault physics-wise and engineering-wise, to look for evidence in the quality of the skymaps themselves that everything is fine with the instrument on the ground is a non sequitur, to say the least.

IV-6.9 The proof offered: Bicep1 vs Bicep2

Let us nevertheless consider the self-explanatory Figure IV-27. Here we see that for the E-mode polarization, there is some correspondence between BICEP1 and BICEP2 (Not so for B-mode). Specifically, the directionality of the features in the map seems to be the same.

Note that BICEP1 did not have the grid type focal plane. It had the tried and true dual polarized horns in its focal plane. But this is not to say that everything else was fine with BICEP1. This is not the subject of the present investigation. To summarize:

We end up with a stark contradiction between basic physics principles and basic antenna design principles in the textbooks on one hand, and the phenomenally precision astronomical observations reported by the BICEP2 team on the other:

SCIENTIFIC DESIGN ANALYSIS: The telescope is not capable of measuring polarization features in the CMB radiation because of its small aperture, and faulty design of the antenna elements. The telescope's imaging plane has a pronounced directionality, and adds an instrumental polarization component across the skymap. Tighter packing of antennas cannot lead to higher resolution beyond a certain point – which was crossed by a great extent.

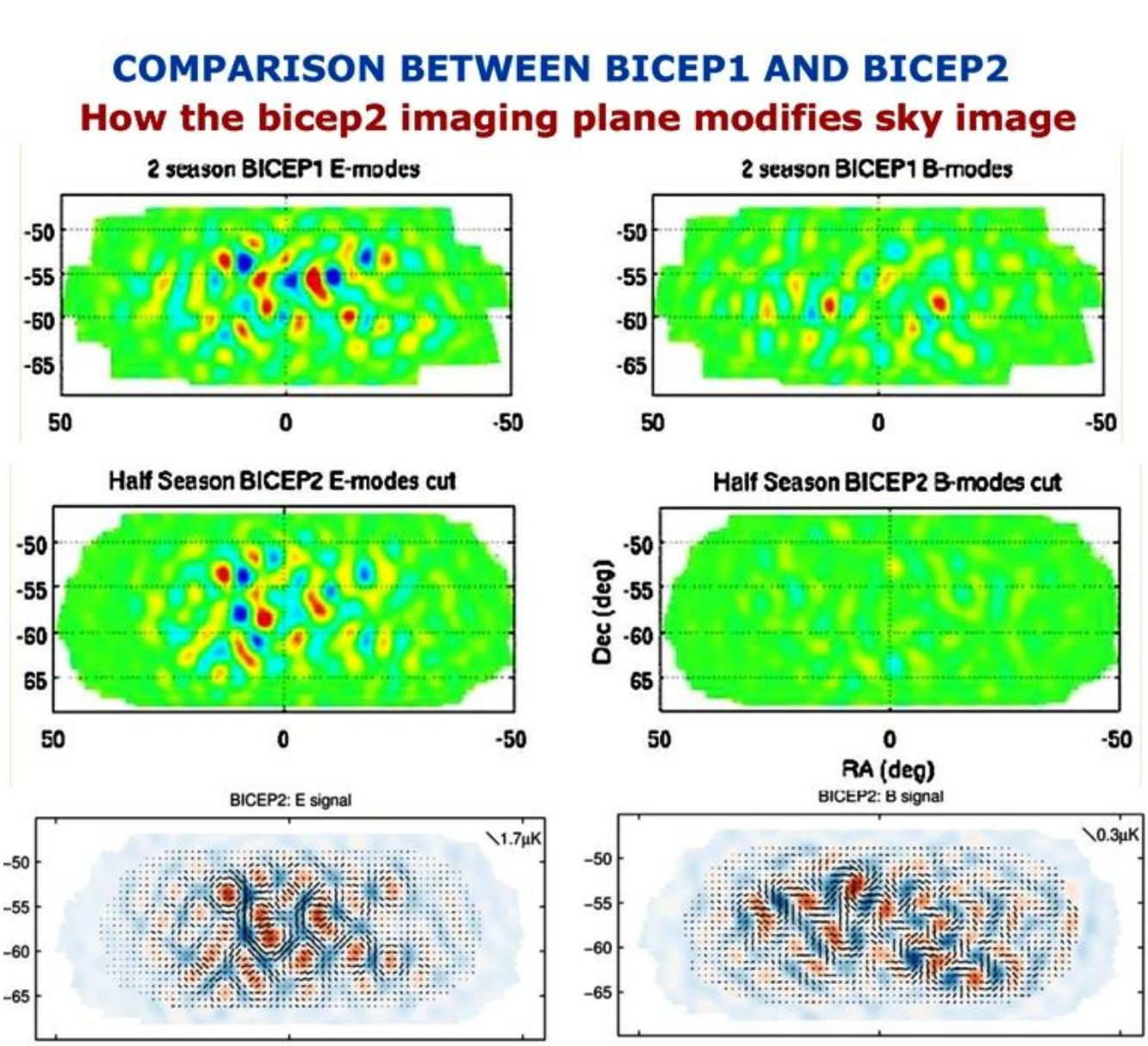


Figure IV-27: Comparison of BICEP1 (with dual polarized horn antenna arrays in the imaging plane) and BICEP2 (with the experimental slot antenna array in the imaging plane) skymaps.

OBSERVATION REPORTED: The telescope is reporting with extreme confidence crisp, tightly woven high resolution polarization skymaps that do not depend on the angular orientation of the telescope about its axis.

IV-6.10 Image presentation

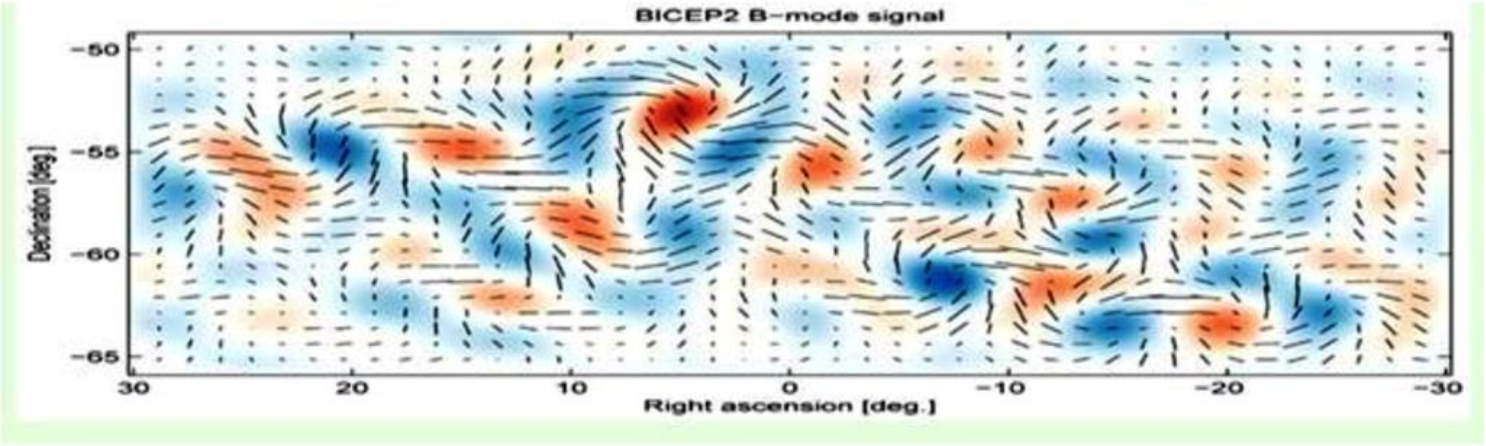
When the BICEP2 sky images of polarization in the Cosmic Microwave Background radiation were unveiled, they were plotted on a Right Ascension-Declination diagram with different scales for the different axes. On this diagram, the full moon would look like a vertical bar. In Figure IV-28, I have resized one such diagram to where the full moon would look like a circular disc.

And what do we see here? There was a preference of the gravitational waves produced during the inflation era 14 billion years ago to favor the Earthly coordinate system. A coincidence? Let us explore further.

We can take a red pencil and mark as many right angles as can be found. All of them are perfectly aligned with RA-Dec coordinate system. Another coincidence? No. These are clear and expected results of the BICEP2 instrumental botch-up.

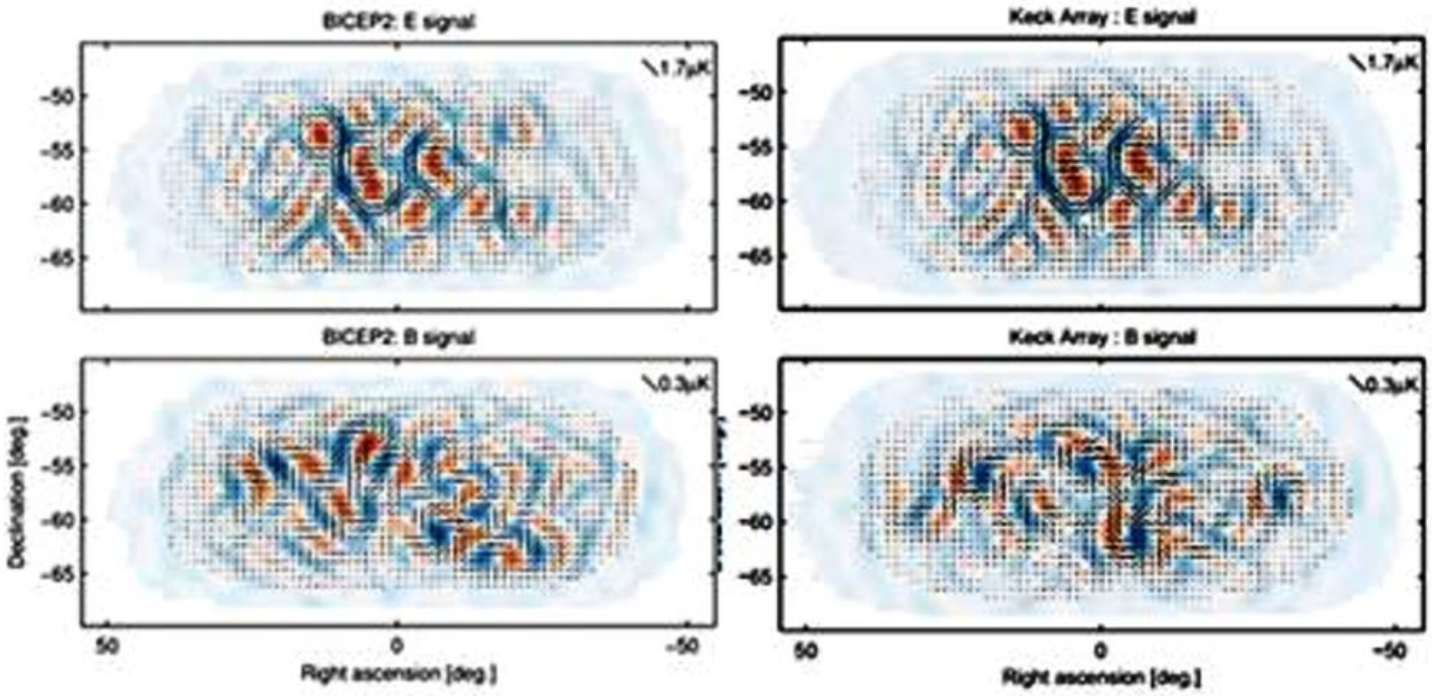
IV-6.11 The botch-up on-the-sky

Since the imaging plane is manifestly faulty in so many basic ways, there is no need to look to the sky images for signs of the botch-up. However, when there emerged comparison skymaps between BICEP2 and the Keck Array telescopes for the very time, something very strange was immediately evident (Figure IV-29).



BICEP2 B-MODE SKY SWIRLS PLOTTED ON THE SAME RIGHT ASCENSION AND DECLINATION SCALE. NOTICE THAT THE POLARIZATION SWIRLS HAVE A PRONOUNCED DIRECTIONALITY: THEY HAVE AN ELLIPTICAL TENDENCY WITH THE LONG AXIS ALONG A CONSTANT DECLINATION LINE. THE B-MODE POLARIZATION FAVORS THE ORIENTATION OF OUR LITTLE PLANET!

Figure IV-28



http://arxiv.org/abs/1502.00643

Figure IV-29: Comparison between BICEP2 (left) and Keck Array skymaps of E-mode (top) and B-mode (bottom) signals.

Here the two telescopes had exactly the same imaging technology and were observing exactly the same spot of the sky from exactly the same spot on the Earth at exactly the same frequency. The E-mode skymaps are exactly the same to the minutest detail (examine the original figure), and the B-mode skymaps are altogether different. It is hard to say what is going on without knowing the relative orientation of the imaging planes. But there can in any event be one and only one conclusion: instrumental defect.

The BICEP2 team ushered in a new era of telescope science. They kept presenting assorted polarization maps and averring that the images are "on the sky", "on the sky" … (meaning they are true sky features, and not instrumental artifacts.) When erroneous physics and engineering are plainly evident in the instrument on ground, how one could point to sky images to assert that everything is fine is something I never learned during my stint in radio astronomy or satellite communication.

THE BUST

BICEP2 TELESCOPE DISCOVERY

OBSERVATIONAL EVIDENCE OF COSMIC INFLATION

An investigative report by Bibhas De

WHY THE DISCOVERY NEVER TOOK PLACE

The discovery reported on 17 March 2014 at Harvard University by the bicep2 collaboration of polarization swirls in the Cosmic Microwave Background Radiation (CMB) in the sky predicted by the Big Bang Inflation Theory was, quite simply, not possible. The instrument was mistakenly designed for a CMB power level that is probably two orders of magnitude higher than the level that actually exists in CMB, as determined at great cost by three Big Bang Satellites (COBE, WMAP, Planck). There were no measurements here of CMB polarization.

WHAT LED TO THE SPURIOUS DISCOVERY

I have described hard-to-believe defects with the engineering design of the telescope's imaging plane that make it possible and probable for a spurious discovery to have arisen entirely from within the telescope, while looking at the sky.

First, and incredibly, whereas the principle of the experiment required that the imaging plane have strictly no bias for x axis or y axis, the design was anything but that.

Second, basic principles of antenna design were violated.

WHAT THE DISCOVERERS SHOULD DO NOW

Captain Asoh Defense is best.

Bibhas De

A world education message from www.bibhasde.com 4/17/14

HARVARD UNIVERSITY

Center for Astrophysics

The Big Bang Gravitational Wave Discovery: Scam or fraud?

THE DISCOVERY: On 17 March 2014 Harvard scientists reported the discovery of gravitational waves generated 14 billion years ago following the Big Bang explosion. They measured the polarization of the Cosmic Microwave Background Radiation (CMB), which radiation they assumed to be the same as the Big Bang Relic Radiation from that explosion. The discovery then followed. As proof of this assumption they wrongly cited the work of Penzias and Wilson, and strangely omitted any reference to the universally recognized correct citation: John Mather Discovery that CMB ≡ 3 K Blackbody Spectrum.

THE EXPERIMENT: The discoverers built an instrument to map the polarization of CMB in the sky. This map is predicted from theory to show the imprint of the said gravitational waves.

TABLE 1
MODELED DETECTOR LOADING FROM ELEMENTS IN THE OPTICAL PATH

Element	T_e [K]	Emissivity	Loading [pW]	T_{RJ} [K]
CMB	3	1.00	0.12	
Atmosphere	230	0.03	2.0	
Upper Forebaffle	230	1.00	0.65	
Window	230	0.02	1.0	
IR Blocker 1	100	0.02	0.45	
IR Blocker 2	40	0.02	0.18	
IR Blocker 3	6	0.02	0.01	
Lenses	6	0.10	0.07	
Total			4.5	21

They chose a frequency of 150 GHz near the maximum power of that 3 K Blackbody Spectrum. They then optimized the instrument to extract out this polarized power level. The Table shows the various sources, and the amounts of power they contribute to the telescope's detector. The CMB at 3 K is listed to contribute 0.12 picowatt. This is the polarized component to measure and map.

THE BOGUS DISCOVERY: That 3 K Blackbody is pure Big Bang fiction, and the Mather discovery was a total fraud. The actual power level in the sky at 150 GHz is perhaps 2 orders of magnitude lower than the 3 K power, as has been determined by three Big Bang Satellites. I do not know what the number is, but the Satellite people know (and are not telling). This level is below this instrument's measurement capability or is only marginally measurable. The map they unveiled is some coordinate-dependent spurious effect. It has nothing to do with Big Bang or gravitational wave or inflation, or even with CMB as such. It may not even have to do with any polarization. A spurious power imbalance between two orthogonal channels is all that is necessary.

SCAM OR FRAUD?: The Harvard scientists may not have been aware of the Blackbody issues when they designed their instrument around the 3 K power, but their telling omission of the Mather reference shows they knew this when they reported the discovery. However, this will be neither scam nor fraud if they retract the discovery forthwith, as publicly as they deployed it.

A world education message from www.bibhasde.com 03/23/14

THE COST OF NOT DEALING WITH NASA JOHN MATHER FRAUD:
THE HARVARD GRAVITATIONAL WAVE DISCOVERY SCAM

The announcement on 17 March 2014 by Harvard University's Center for Astrophysics of the discovery of primordial gravitional wave created by Big Bang Inflation is yet another collective scam to wangle the Nobel Prize out of the Swedes. The "discovery" has been announced with big bloviation. The media energizer bunnies have gone into overdrive. Publications are coming out the wazoo. Awards will be coming through the floodgates. The Citation Guy will swing into action. And this is the way psychological pressure is applied on the Nobel Committee. We have seen how this concerted American pressure works on the Committee, in 1978, in 2006 and in 2011.
Consider now a few points:

I. WHAT IS THE FREQUENCY OF THIS MEASUREMENT

The frequency of measurement is 150 GHz. What is special about this frequency? It is near the peak frequency of the Big Bang Blackbody Spectrum.

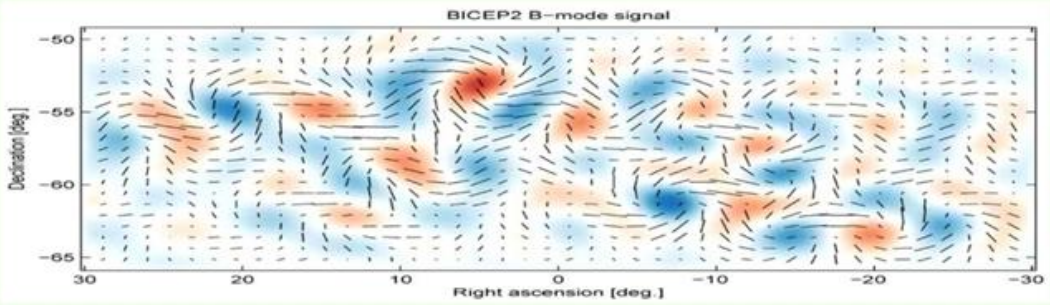
II. WHY WAS THIS FREQUENCY CHOSEN?

Because this Blackbody is the only link between the observed Cosmic Microwave Background Radiation (CMB) and the fictional Big Bang Theory.
It is the only thing that establishes the identity CMB ≡ Big Bang Relic Radiation

III. SO?

The Big Bang Blackbody is a total fraud. There exists no identity established between CMB and Big Bang Relic Radiation. The origin of CMB is unknown, and its spectrum is known to be <u>not</u> a Big Bang Blackbody. The Harvard observation of CMB polarization, correct or not, has no connection at all to Big Bang Theory whose crucial satellite support was gained through fraud.

IV. WHY DID THE GOOD LORD COMPRESS THE WAVES IN DECLINATION?!

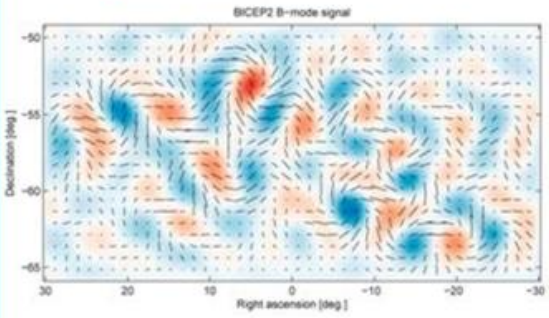


Had NASA John Mather fraud stood publicly acknowledged, this new discovery could not be reported. Harvard scientists are scamming you.

A world education message from www.bibhasde.com 17 March 2014

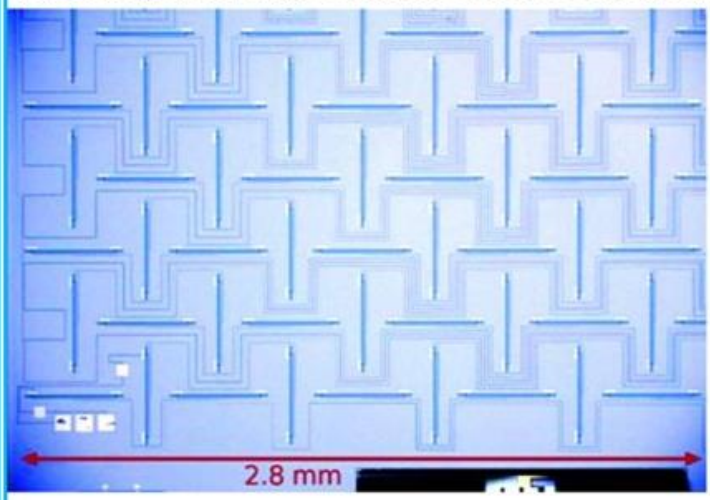
BICEP2 BOGUS DISCOVERY OF COSMIC INFLATION:

A possible instrument effect giving rise to "discovery"



Bicep2 Cosmic Microwave Background Radiation (CMB) skymap shows orientation of polarization in the sky. The unlikely eddy-like twists are uniquely predicted from the Cosmic Inflation Theory of Andrei Linde, Alan Guth *et al.*

Below is a small portion of the detector face of the bicep2 telescope. A portion of the sky is imaged on to this detector face. When a linearly polarized wave is incident on this face, its electric field is split into two orthogonal components, and are picked up by orthogonal antenna elements (bold lines). Thus, depending on the angle of the incoming electric field, the orthogonal antennas will generate different amounts of power. This *power differential* gives the angle of the field. This is how the electric field can be mapped. If the incoming wave is unpolarized (randomly polarized), the *power differential* is zero.



The families of fine lines you see are the electrical connection leads to the antennas. Here is the problem: These lines also pick up some signal from the incoming wave – i.e. they also act as antennas. But the way the printed circuit board has been laid out, the horizontal pick up and the vertical pick up are <u>not</u> the same.

POLARIZATION: There is thus built into this design <u>an inherent finding of polarization</u>: An unpolarized wave will show some degree of "instrumental" polarization.

TWIST: If two adjacent portions of the board received different amounts of unpolarized power, that instrumental polarization will be seen to twist from one region to the other.

GLOBAL MAP: In this way, a global map can be produced, twists and all. This need not have anything to do with CMB. The Bicep2 Telescope will do the job all by itself while looking at the sky, thank you. The patchiness, orientation dependence etc can be provided by other spurious causes which I leave to the reader to think on. One test may be that the signature of cosmic inflation will show some association with the Earthly RA-Dec coordinate system!

That circuit board design may have queered the project from get go. Lord have mercy!

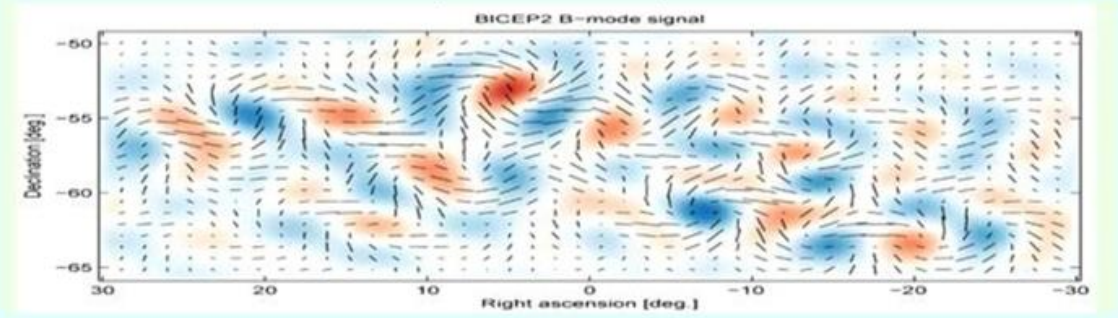
A world education message from www.bibhasde.com 04/14/2014

A WAY TO EXPLAIN BICEP2 DISCOVERY TO KIDS:

Grids in the telescope got distortedly projected onto the sky – through a geometrically complex but physics-wise simple way.

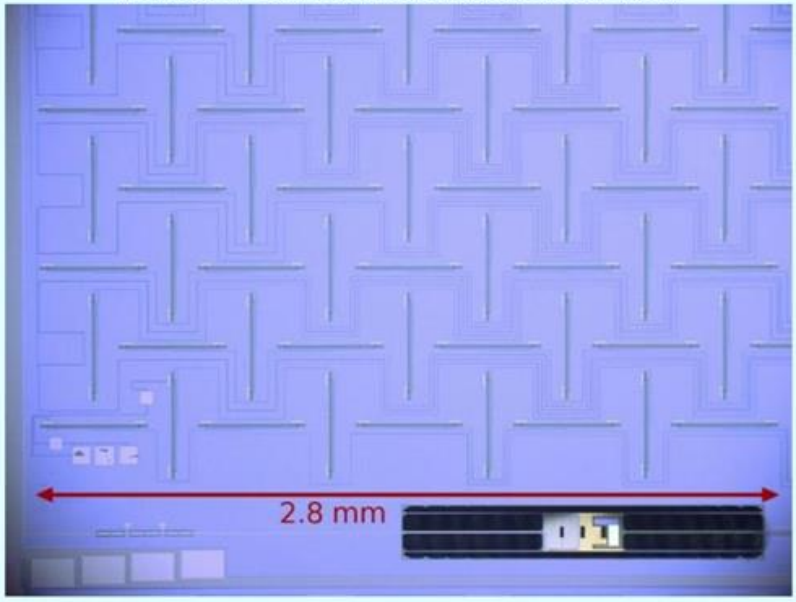
THOSE GRIDS IN THE SKY!

(BICEP2 SKYMAP GRIDS)



THEM GRIDS IN TELESCOPE!

(PORTION OF BICEP2 TELESCOPE IMAGING PLANE GRIDS)



THEREFORE NO OTHER INSTRUMENT CAN REPRODUCE THE BICEP2 GRIDS IN THE SKY

A world education message from www.bibhasde.com 05/02/2014

BICEP2 TELESCOPE ISSUES

PROOF-OF-CONCEPT STUDIES NEVER DONE / WHAT THEY MIGHT HAVE SHOWN

1. TELESCOPE BEAMS: Measurements of the beam patterns and Gains on the telescope-shield assembly under its operating conditions, for at least a representative selection of the horizontal and vertical slot antenna groups spanning the focal plane, for E and H planes. (It was entirely possible to improvise a fine *ad hoc* antenna range on location.)

GIVEN THE FAULTY IMAGING PLANE DESIGN, BEAM PATTERNS WOULD HAVE REVEALED A WHOLE HOST OF DROP-DEAD PROBLEMS.

2. BEAM STEERING DATA: By what angle the telescope beam is steered off-axis and how its shape and gain change as one moves across the imaging plane.

THIS MISSING STUDY IS THE ENTIRE GEOMETRIC BASIS FOR MAPPING THE SKY.

3. POLARIZATION SENSITIVITY: The corresponding patterns for polarization sensitivity (linearly polarized power received for a 180-degree rotation of the transmitter about its axis), for horizontal and vertical slot antennas.

THE CROSS-POLARIZED POWER MAY NOT HAVE GONE TO EXACT ZERO – BIG PROBLEM!

5. ISOLATION: Demonstration that power transmitted through a horizontal/vertical antenna doesn't enter adjacent vertical/horizontal antennas.

THERE WOULD BE UNWANTED CROSSTALK BETWEEN HORIZONTAL AND VERTICAL SLOTS.

6. STRIPLINE LOSSES: Demonstration that for any given unit of paired horizontal and vertical antennas, the stripline loss is the same when the stripline lengths and layout geometries are not the same.

LOSSES MAY BE DIFFERENT – EVEN THE TINIEST DIFFERENCE CAN BE FATAL.

7. SOURCE SYNTHESIS: In the bicep2 antenna range, one could synthesize an extended "sky" source by moving the transmitter (manually or automated) in a raster scan.

WOULD SHOW DEFECTS IN THE IMAGING PLANE DESIGN THAT FAKE GRIDS IN THE SKY.

8. MOON SWEEP TESTS: Would not Moon sweep have been possible with bicep2 (as with Big Bang Satellites)? This could be used to test the entire the imaging plane.

WOULD HAVE REVEALED PROBLEMS WITH THE IMAGING PLANE.

9. INTERFACING: There needed to be close consultation between the antenna guy the microstrip circuit layout guy on the imaging plane design. Or were they the same?

THERE WAS A FATAL ISSUE OF COMMUNICATION OR COMPETENCE.

10. WRONG EMPHASIS: Scientists seem to be seduced by engineering D&D of detection "gadgetry" and not so much concerned with scientific R&D of electromagnetic/optics.

FATAL – FATAL - FATAL. COBE ALL OVER AGAIN!

A world education message from www.bibhasde.com 05/07/14

THE BICEP2 TELESCOPE:

CRITICAL TESTS WERE NEVER DONE

An improvised antenna pattern range could have been readily set up on location (before mounting the telescope assembly on rooftop) for the <u>essential</u> characterization of beam patterns, beamwidths, beam deviations, on-axis Gain, mapping the polarization characteristics of the entire focal plane, etc. None of these seems to have been done. The telescope went straight into the Discovery Mode. This is what might have been (and what would have avoided the great botch up):

IMPROVISED BICEP2 ANTENNA RANGE AT SOUTH POLE

Bicep2 antenna assembly
mounted in a side-looking stance

Transmitter: Linearly polarized
horn and Standard Gain Horn

The bicep2 antenna assembly has its own positioning system and position readout. Thus we have here a complete, high quality, professional antenna range. After all the tests are done and test data evaluated, the bicep2 assembly can then be mounted on rooftop in a skyward-looking stance. This telescope would be technically sound and scientifically defensible.

A world education message from www.bibhasde.com 05/05/14

THE BICEP2 TELESCOPE:

WHY NOT THE MOON?

The Big Bang Satellites consider sweeping their antenna across the Moon the most critical test. It could be even more so for bicep2: The radiation from the Moon is unpolarized. So both bicep2 beam pattern and bicep2 polarization performance could be tested on a source in the sky. This does not seem to have been done.

THE MOON WAS SWEEPABLE BY BICEP2 TELESCOPE

Perhaps there were good reasons. Could the telescope not detect any signal from the Moon at 150 GHz, with a 30% bandwidth? George Smoot's COBE-DMR experiment could see the signal at 90 GHz with a radiation collecting aperture far smaller than bicep2.

Anyway, if the Moon signal could be seen by bicep2, then one needed to make the most of it in terms of proving the telescope on a tried-and-true source in the sky.

A world education message from www.bibhasde.com 05/05/14

SECTION IV
BICEP2 COVER UP

CHAPTER V-12
BICEP2 Collaboration

V-12.1 The project should never have started

The BICEP2 team set out to find B-mode polarization swirls in the sky predicted from inflation theory. The first scientific assessment that needed to take place was whether or not the prediction was sufficiently defined to merit verification. It seems that it was determined to be so. The prediction gave quantitative values of the strength of the polarized component of the relic radiation. It predicted that the B-mode polarization would have a strength of about 10% of the E-mode polarization, and the E-mode polarization would be about a million times weaker than the intensity of the relic blackbody.

From these the experimenters figured out that detection of B-mode polarization would require a sensitivity of measurement of 1 part in 30 million.

This sensitivity was not achievable by the BICEP2 telescope, no matter what type of instrumentation was put in it. So the question is: Why did this project get started in the first place? How did the project get past the proposal reviewers? Who was minding the store as far as public funds are concerned?

But let us also consider what happened after it did get started. When it was decided to go from the focal plane horn antennas to the “printed circuit” slot antennas, why was not proper expertise sought out? Why were not polarization characteristics of the individual slot antenna measured and compared with that of the dual polarized horn antenna that was to be made obsolete? Why did not the printed circuit designed follow the well-known principles of antenna array design rather than packing the antennas like sardines? Who said that closer the antennas are, the sharper the definition in the sky? Why was the quality of detectors (of secondary importance) bandied around all over the place, and why was nothing at all discussed about the properties antennas (of supreme importance)?

V-12.1 Two views on BICEP2

We will now discuss two views on BICEP2 project as it played out to the end. The first is the view of the scientific establishment, normally the only view that matters and that the world pays attention to. But then for anyone interested, I will also present my view.

The initial reaction of the establishment was one of ecstatic euphoria. They just could not find enough laudation in the English language. Pundits were bloviating all over the place.

But even as this was happening, there were a few rare voices of caution (even before the foreground/background debate started.) For example, Lisa Randall of Harvard University voiced caution publicly (and perhaps courageously), her reserve stemming from, among other issues, the fact that the BICEP2 B-mode signals were far larger than predicted by theory.

One other person merits mention: Edward Witten of Princeton University. It was logical for people to seek out his comment on the discovery, and also logical for Witten to issue a comment. Such a comment would have carried tremendous weight at that juncture. But to my surprise Witten remained silent.

When the foreground/background issue arose, the establishment went quiescent for a while. But as the direction the matter was taking became apparent, there arose a cacophony of homilies whose clear intent was to minimize the damage to the BICEP2 team's reputation and even to put a positive spin on things. This movement became so bizarre that hardcore theoreticians started expressing opinions to the effect that the team had made a great contribution by developing excellent instrumentation. Also, when the Planck satellite data showing that the B-mode signal could be due entirely to galactic dust foreground finally put the discovery to rest, the door was still left open: A little bit of that B-mode signal might have been due to gravitational waves after all! Comments like "The jury is still out" kept popping up. They were not going to give up on a good thing so easily.

In the end it was said that the BICEP2 team made the first observation of B-mode polarization in the sky – a great achievement in itself. After this, could the discovery of gravitational wave be far behind? The team was

encouraged to carry on with the good work, undaunted.

There was exactly zero accountability for what transpired right before the eyes of the world. No blame was ever assigned.

Now for my view. As I have said, this project should never have begun. The scientific establishment is to blame for letting it proceed. Having begun the project, it was badly botched – because of ineptness of the researchers, combined with the lack of adequate establishment scrutiny. For this the establishment is to blame. When I exposed the inner workings very fully, the scientific establishment – which had the complete ability to understand my position very completely – chose to look the other way and to party on. The establishment is to blame.

There needed to take place an inquest just like the ones that took place with regard to the reported discoveries of Jan Hendrik Schön and Victor Ninov. Instead, the wagons were circled.

CHAPTER V-13
Planck Collaboration

V-13.2 Planck Collaboration and BICEP2 Collaboration

When the BICEP2 matter came along, everyone looked to Planck Collaboration for support. There was the issue of how much of the BICEP2 B-mode signal was due to the deep background CMB and how much of it was due to the foreground galactic dust. For the BICEP2 discovery to stand, it was necessary to demonstrate that the latter contribution was minor. And only Planck Collaboration had the data bearing on the foreground emission.

This was the issue as it was presented to the public by both Planck and BICEP2 Collaborations. But it was not the real issue. The real issue was that the BICEP2 B-mode signals were the result of total instrumental botch-up. The B-mode sky swirls were artifactual.

Planck Collaboration, a part of ESA, had access to the most advanced engineering knowhow in the field. Therefore they, if anyone, would know that BICEP2 was an instrumental botch-up. Therefore, they would not engage in such a collaboration with BICEP2 that by the act itself would aver that the BICEP2 measurements were scientifically sound.

But they did. They showed that the foreground was the dominant contribution. This made the BICEP2 discovery of the primordial gravitational waves go away, but solidly confirmed that BICEP2 was the first instrument to observe B-mode swirls in the sky. Planck Collaboration knowingly covered up the BICEP2 instrumental botch-up.

It should be mentioned that Planck Collaboration has many American members, and BICEP2 Collaboration has European members. So the line of demarcation is not all that clear.

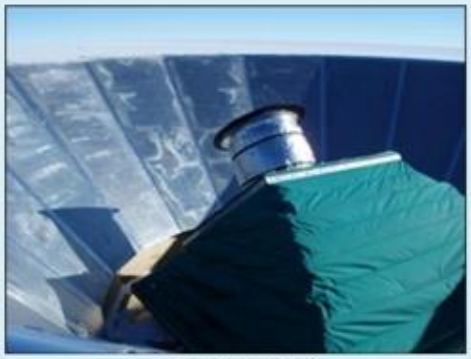
Planck satellite has acquired very high quality, highly valuable data. There is no question about this. But as long as this treasure trove is considered the private playground of Big Bang cosmologists, everyone else would feel excluded, not welcome. The treasure trove would remain de facto a private property. The lasting legacy of Planck satellite will be that they repeatedly covered up American botch-ups.

THE AFTERMATH

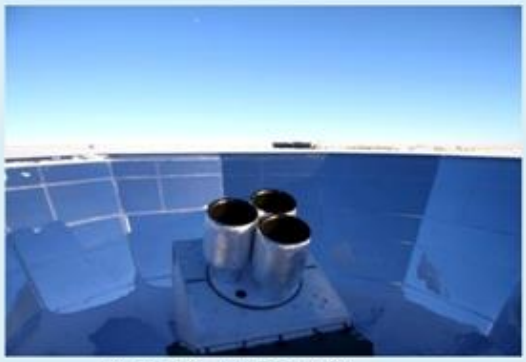
INFLATIONARY COSMOLOGY

TELESCOPES IN TROUBLE

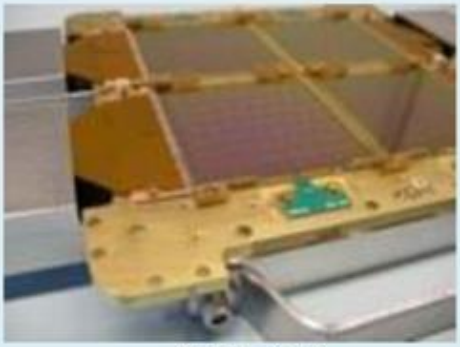
My discussion of the bicep2 telescope imaging plane electromagnetic issues leads to the direct conclusion that all other telescopes using a similar technique are in need of expert reevaluation. These telescopes include:



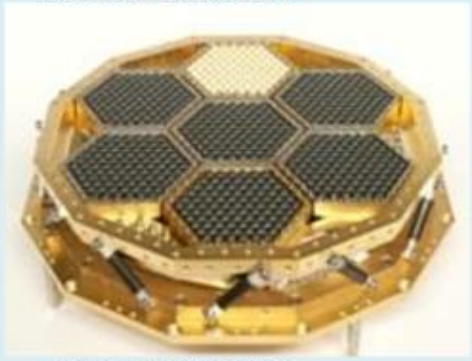
BICEP3



KECK ARRAY



SPIDER



POLARBEAR

Also, any telescopes whose apertures have been designed under the assumption of the 2.7 K blackbody radiation power in the sky are irrevocably lost. They are off by orders of magnitude.

As recently as 30 May 2014, Professor Amber Miller of Columbia University, a prominent leader and representative of this field, averred at the *World Science Festival* that the COBE Satellite discovery of the picture perfect 2.7 K blackbody is perfectly intact. She has been posited as a vanguard of American scientific excellence.

LORD HAVE MERCY!

A world education message from www.bibhasde.com 06/05/2014

WHY THE BICEP2 B-MODE POLARIZATION MAPS ARE AN ARTIFACT

(Summary of previous posts with detailed scientific and engineering analysis)

1. The revolutionary innovation of *small* aperture telescope was based on misunderstanding of telescope science.

2. The instrument was designed around a CMB sky power level that is far larger than the actual CMB power level.

3. The antenna design has fatal engineering fault.

4. The array design has fatal physics fault.

5. Whereas the imaging plane absolutely needed to have the X and Y axes interchangeable, this was not the case by far. This is fatal.

6. The above would cause the sky map to change with telescope rotation. BICEP2 offers no test data to show otherwise.

7. No proof-of-concept antenna range-type tests exist on individual antennas and antenna array. The instrument is therefore *unproven*.

8. The quality of detectors have been loudly touted to attest to BICEP2 quality. Detectors play no part in the instrumental botch up.

9. No documentation of expert review of the imaging plane design.

10. No auxiliary (demonstration) sky measurements (e.g. the Moon?) other than the discovery measurements.

11. A multimillion dollar precision scientific instrument was randomly spun during the taking of measurements.

12. The crisp, clear and tightly woven B-Mode sky swirls have elliptical shape with the axes of the ellipse *perfectly aligned* with the telescope's coordinate system.

But, never mind the science! The ESA Planck Collaboration has certified that the BICEP2 instrument is A-OK.

A world education message from www.bibhasde.com 09/24/2014

BICEP2: WHY DUST WAS NEVER AN ISSUE

What was the bicep2 discovery, exactly?

Polarization skymaps of the Cosmic Microwave Background Radiation, showing telltale swirls predicted by Big Bang Inflation Theory.

So where does dust figure in this?

The discoverers said that their polarized signal levels could not be explained entirely as resulting from radiation from galactic/interstellar dust existing in the field of observation, because there is not enough dust.

And what is this "dust debate" about?

Critics say that there may be enough dust. So the entire debate is essentially about how much dust there is.

What is wrong with this debate?

The debate is entirely irrelevant and altogether misplaced.

If the swirl patterns are confirmed, then Inflation is confirmed. Dust cannot generate the exquisitely detailed and incredibly nuanced geometry of the patterns, regardless of how much dust there is.

If the swirl patterns are not confirmed, then there is nothing at all to debate.

Why do the swirls need confirming?

The orientation of the observed tightly woven pattern in the sky corresponds to an average orientation of the imaging plane in the telescope on the ground. Neither has it been explained why this averaging is a valid procedure nor has it been shown that changing the imaging plane orientation leaves the Inflation skymap unchanged.

OMG! The scientists never told us *that*! Please tell us more.

LORD HAVE MERCY!

A world education message from www.bibhasde.com 06/21/2014

BICEP2 INSTRUMENATION

TWO TELLING REVELATIONS:

I. A LITTLE TURN OF THE PRAYER WHEEL!

If you are taking a one-minute exposure photo on a dark night with your $5000 NIKON, would you tap the camera every 10 seconds just to make sure everything is cool. Bicep2 Team does! Can you imagine a multi-million dollar cutting edge scientific instrument needing a little Buddhist prayer wheel spin every night?

"Finally, to remove from the system any effects that might arise from having a preferred direction, we spin our telescope around its axis every day." – Jamie Bock

[http://www.caltech.edu/content/building-bicep2-conversation-jamie-bock]

II. LET'S TEACH 'EM EXPERT INDUSTRY PROFESSIONALS!

If you, a non-professional non-expert academic, design something cutting edge for the first time and take it to the professionals to manufacture it and they say it is "crazy", what do you do? The Bicep2 Team "teaches" them to make it regardless.

我們的實驗非常複雜，所用的物理與工程概念既廣且深，每部分都是團隊自行設計。我們隨時都要找廠商，將設計圖製造出來。一開始找廠商製作這種望遠鏡，被廠商視為「瘋狂」，但我們教導他們，最終廠商也成功製造出來，他們不知道他們公司可以做到。我們的科學目標雖然高遠，這也算我們無形中提供的產學合作的入世價值吧。

[http://udn.com/NEWS/NATIONAL/NAT5/8863763.shtml]

GOOGLE TRANSLATE:

"Our experiment is very complex physics and engineering concepts used in both broad and deep, each part is designed team. We are always looking for vendors to design manufactured. Start looking for a vendor making this telescope are manufacturers regarded as "crazy," but we teach them, and ultimately the success of vendors created, they do not know their company can do. Although our scientific goals lofty, this, too, the value of industry-university collaboration WTO we virtually offer it." – Chao-Lin Kuo

LORD HAVE MERCY! A world education message from www.bibhasde.com 08/26/2014

BICEP2 TELESCOPE DISCOVERY

LET THE RECORD STAND CLEAR ON POSITIONS TAKEN!

SKY MEASUREMENTS VALID (DISCOVERY NEEDS CONFIRMATION):

HARVARD UNIVERSITY

AIP American Institute of Physics

U.S. HOUSE OF REPRESENTATIVES

THE KAVLI PRIZE

esa

ASTRONOMICAL SOCIETY OF AUSTRALIA 1966

JPL Jet Propulsion Laboratory

SPACE TELESCOPE SCIENCE INSTITUTE

NSF

THE KAVLI FOUNDATION

W.M. KECK FOUNDATION

TIME

BICEP2 IS AN INSTRUMENTAL BOTCH UP:

- Bibhas De

www.bibhasde.com

http://dreamheron.wordpress.com/

A world education message from www.bibhasde.com 07/28/2014

Lest we forget:

THE BICEP2BUSTERS

These boys hijacked the bicep2 discovery, and under the clever cover of the dust cloud they kicked up, they replaced the Bicep2 Boys as media celebrities.

Never has such a load of oxdung been slung by such high academics.

Luckily for the Universe, Dreamheron deigned to look at the issues and declared that the telescope was a botch up job. ~~Luckily for the World, the Bicep2 Boys showed good scientific judgment in studying Dreamheron's advice.~~

Raphael Flauger David Spergel Paul Steinhardt

Uroš Seljak Michael Mortonson

Subir Sarkar Philipp Mertsch Hao Liu

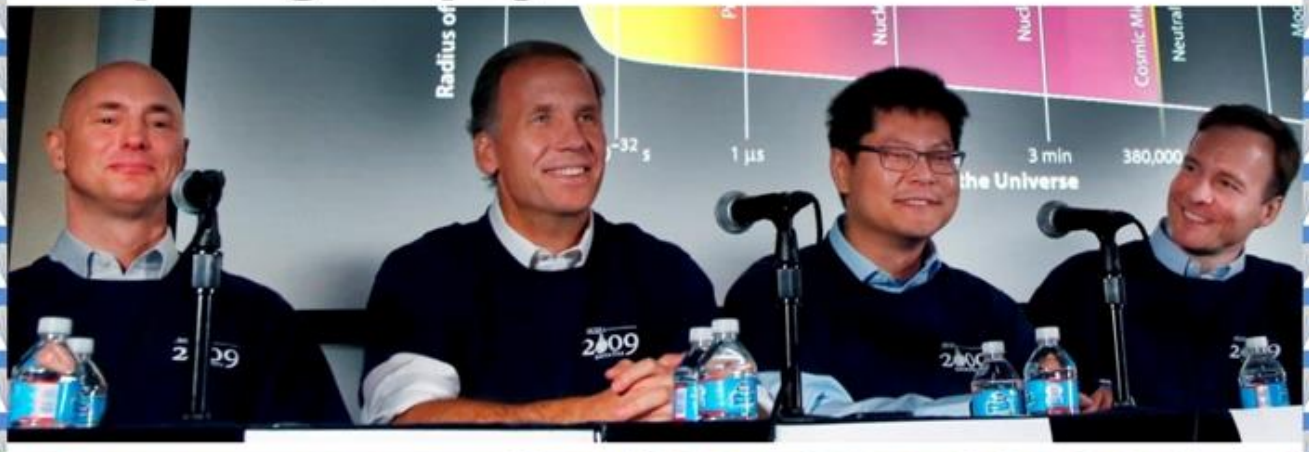
LORD HAVE MERCY!

A world education message from www.bibhasde.com 06/16/2014 Corrected 06/20/2014

SMILING FACES GOING PLACES ON AIR BIG BANG

BUT BEFORE YOU GO, WHERE ARE THE SKY MAPS SHOWING THAT THEY REMAIN INVARIANT WITH RESPECT TO A ROTATION OF THE TELESCOPE ABOUT ITS AXIS?

Inquiring taxpayer minds want to know!

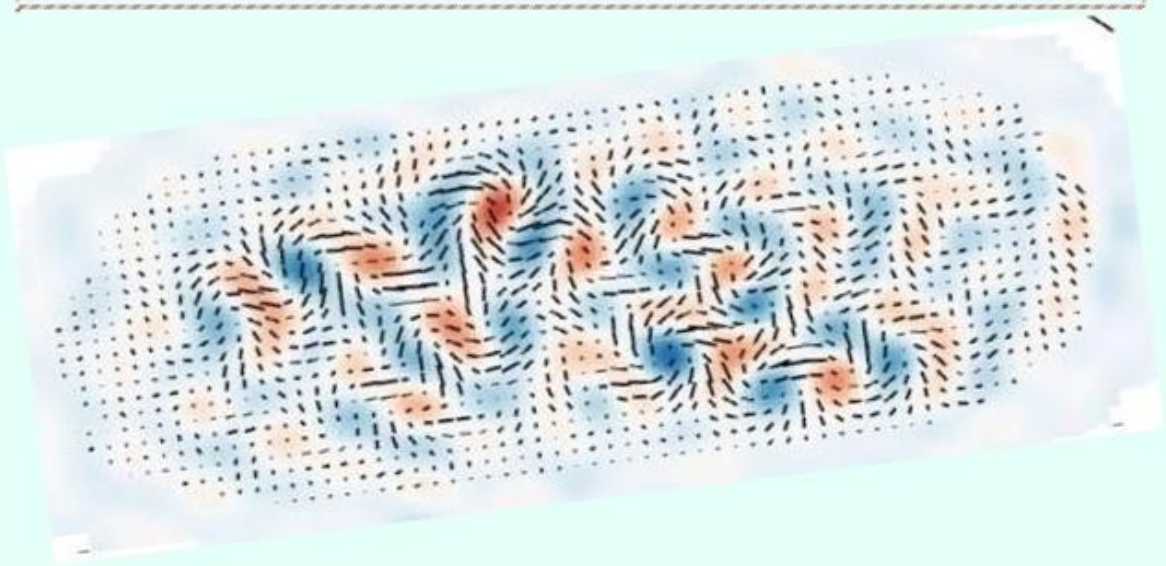


Well?

A world education message from www.bibhasde.com 05/27/2014

THE AMAZING SOUTH POLE BIG BANG CARNIVAL AND THE RAREE SHOW:

THE OMG! UNIVERSE TWIRLER



INSTRUCTION:

DROP TWO QUARTERS IN THE SLOT FOR 15 MINUTES OF PLAY TIME. TURN THE TELESCOPE BY THE RIM AND WATCH THE GRIDWORK IN THE SKY TURN – NOW GO FASTER AND FASTER. KIDS, YOU ARE TWIRLING THE BIG BANG UNIVERSE!

This exhibit courtesy of Harvard, Stanford and CalTech. Your tax dollars at work. May 2014

PRINCETON UNIVERSITY

The crime scene "cleaners"

They use sophisticated strategy. When a scientific enterprise is exposed as a fraud, the fraudsters may secretly contact the supersecret Princeton Cleaner Squad. The latter issues an acrimonious *scientific* criticism of the said enterprise. An innocuous and seemingly healthy scientific debate rages, totally deflecting attention from the culpable issue of fraud. Faces are saved. Taxpayers are screwed.

DAVID SPERGEL

THE BICEPE2 BOTCHED INSTRUMENT

BICEP2 was a laughably quack instrumentation job. The sky grids it reported were a consequence of the gridwork inside the instrument. But Spergel and his colleagues issued a scientific position that the BICEP2 telescope was observing something other than what it claimed to have observed: It was seeing foreground galactic dust rather than signature of inflationary gravitational wave. Thus an instrumental botch up was spinned as an innocent and understandable scientific misreading of the results reported by a fine instrument.

PAUL STEINHARDT

COSMOLOGICAL INFLATION FRAUD

Cosmological inflation theory is a fraud because the cosmic microwave radiation (CMB) it posits as Big Bang relic radiation is in scientific evidence as NOT so. No identity between CMB and the relic radiation has ever been established. But Steinhardt and his colleagues raised holy hell by mounting acrimonius *scientific* criticisms of inflation theory, thus deflecting attention from the taxpayer fraud that needed to be ended.

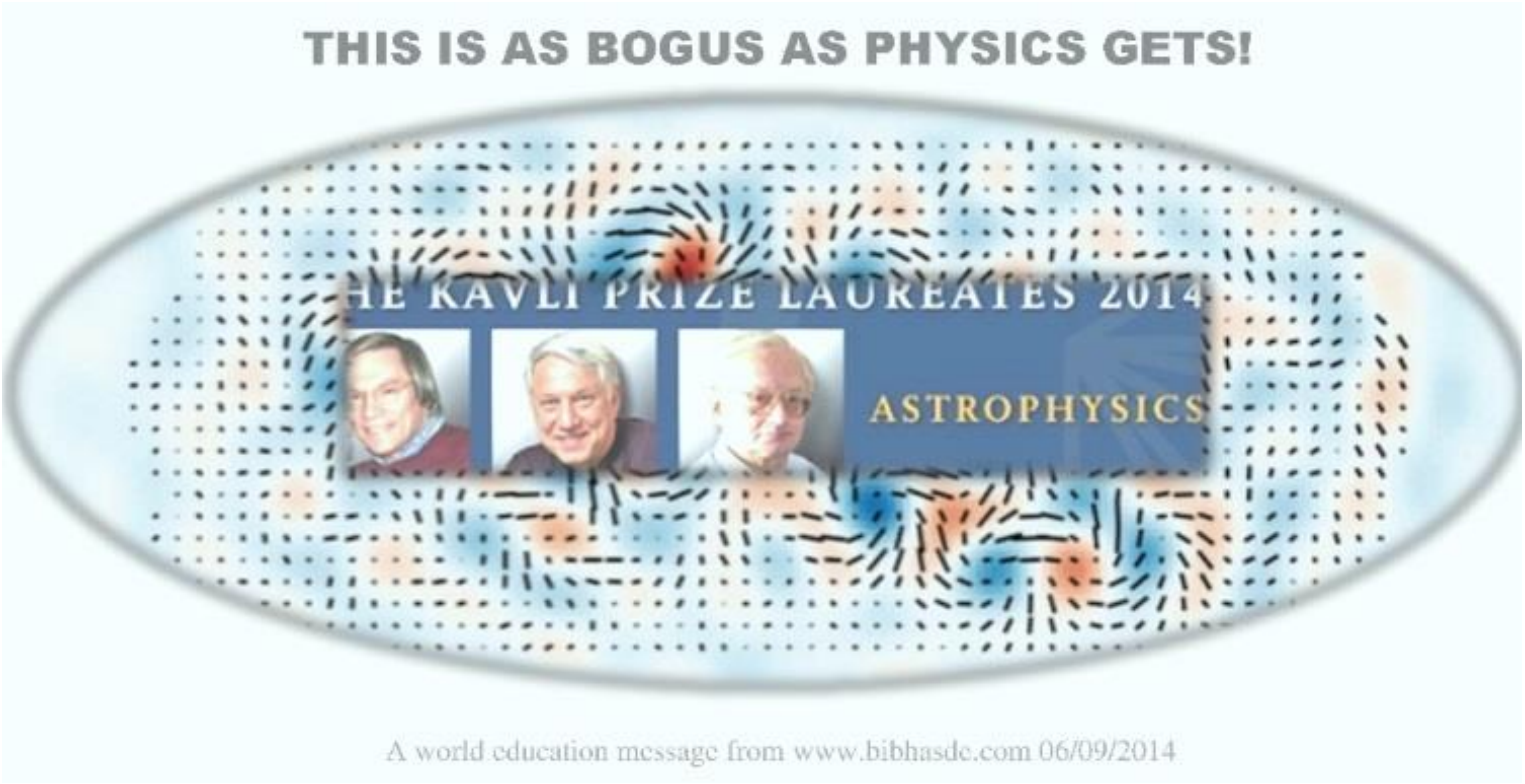
A world education message from Bibhas De 05/18/2017

PHYSICS: THE LINDE-GUTH NOTHINGBURGER

(BICEP2 patty)

Andrei Linde **of Stanford University and** ***Alan Guth*** **of MIT are two of physics's brightest stars, famous for their cosmological inflation theory (theory of the early stages of Big Bang). The theory utilizes analysis of the spatial (or angular) distribution of the intensity of the cosmic microwave background radiation (CMB). At the core of this theory is the assumption that this CMB is the relic radiation left over from the Big Bang explosion. This identity is considered proved by multiple observations showing CMB has the ~ 2.7 K blackbody radiation spectrum, the predicted signature of the relic radiation.**

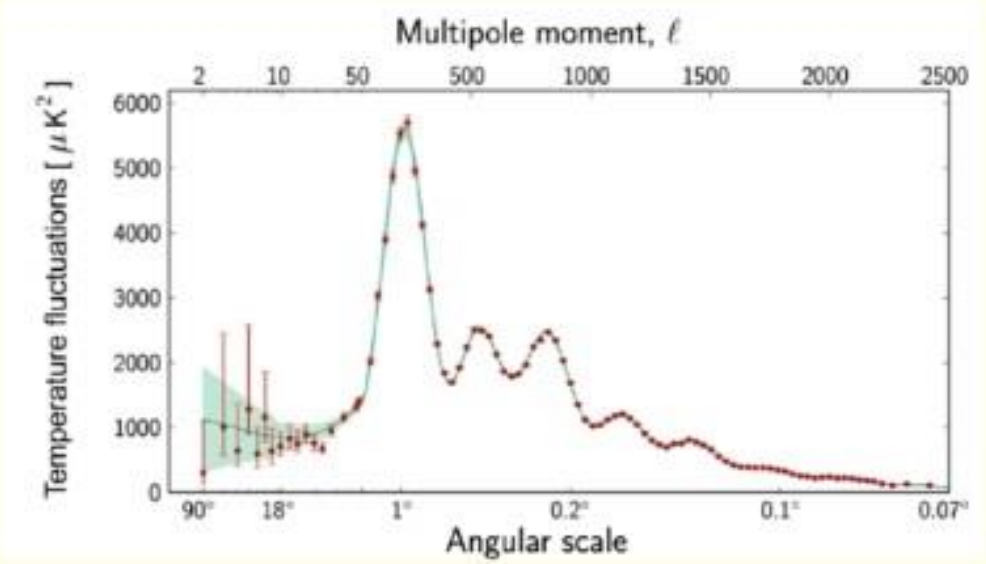
Every single one of the above "multiple observations" has been placed in expert scientific and engineering evidence in the public arena as scammed or fraudulent: CMB and Big Bang relic radiation are totally unconnected. Hiding behind their academic privilege, Linde and Guth have ignored this finding and forged ahead, with more taxpayer money. A recent attempt to further strengthen the Linde-Guth ideas by their colleagues (the BICEP2 team) was also shown to be a laughable quackery. The lifework of Linde and Guth amounts to naught. Truth be told, science would have breathed better if Linde and Guth had chosen another line of work. **A world education message from Bibhas De 05/15/2017**


THIS IS AS BOGUS AS PHYSICS GETS!
HE KAVLI PRIZE LAUREATES 2014
ASTROPHYSICS
A world education message from www.bibhasdc.com 06/09/2014

BIG BANG COSMOLOGY

The Second CMB Deception

The FIRST CMB Deception tried to pass off CMB radiation as the 3 K blackbody relic radiation predicted by Big Bang. That fraud having been exposed, they now say that CMB *is* relic radiation because it fits Big Bang prediction of the relic radiation *power* spectrum (related to the anisotropy geometry of observed CMB):



This scam is rather subtle. The theoretical curve above was set by events in (the parameters of) the Inflation Era, which would be imprinted in the theorized relic radiation. At some point after the Inflation Era, this relic radiation assumed the blackbody form – still carrying the imprint. So the above theory line can be compared with CMB *if and only if* the latter has the blackbody form.

But the blackbody form of CMB radiation has been repeatedly falsified by satellite observations. The CMB data points above are not from a blackbody. So this theory-experiment comparison is a comparison between apples and oranges. The impressive agreement is the scam. The true CMB spectrum is accurately known from the WMAP and Planck Satellites, and has been deep sixed so the scam can continue.

A world education message from www.bibhasde.com 12/05/2014

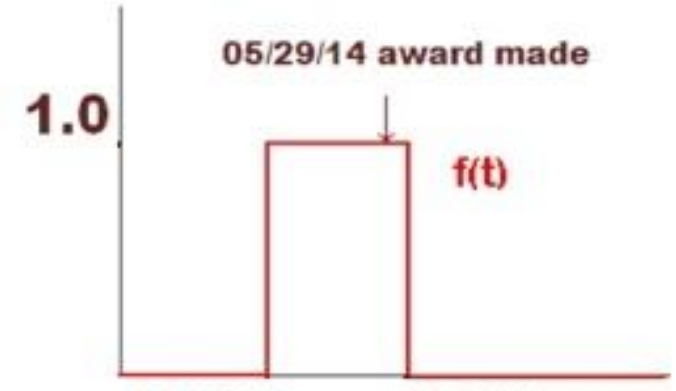
Time is of the essence!

THE KAVLI PRIZE 2014

for theory of inflationary cosmology

THE KAVLI WINDOW-OF-OPPORTUNITY PRIZE

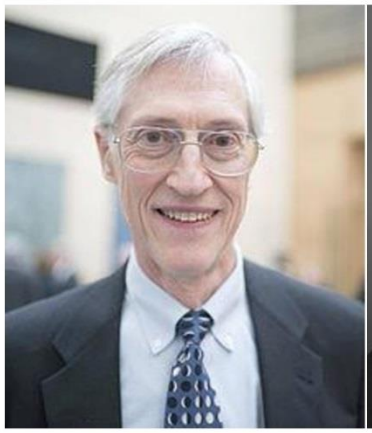
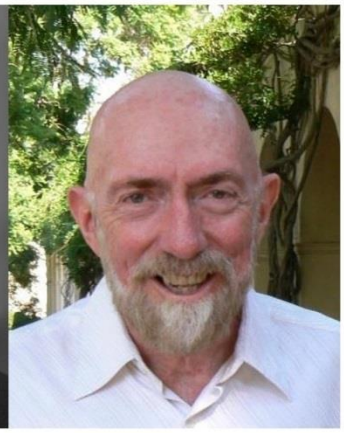
(y = 0: no verification, no award; y= 1: verification, make award)



LORD HAVE MERCY!

A world education message fro www.bibhasde.com 06/09/14

TIME MAGAZINE'S
MOST INFLUENTIAL MEN IN THE WORLD

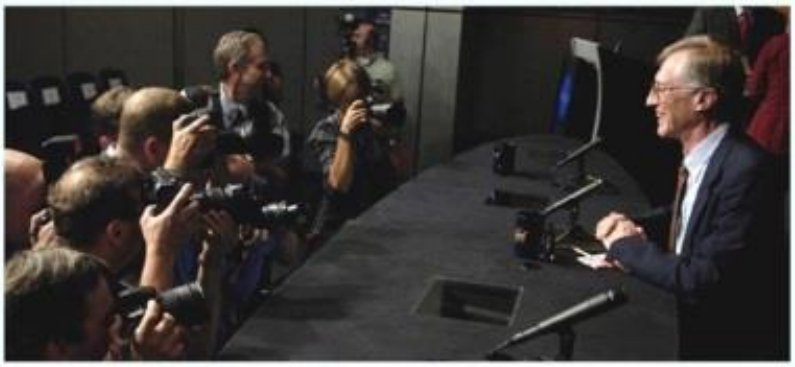
2007	2014	2016
		
JOHN MATHER	JOHN KOVAC	KIP THORNE
COBE	*BICEP2*	*LIGO*

LORD HAVE MERCY!

COBE and BICEP2

BIG BANG COSMOLOGY EXPERIMENTERS

Ushering in the New Age of Mind-bending Measuring Accuracy



NASA

NASA's John Mather holds Press Conference in October 2006

"Dr. Mather and the COBE team showed that the cosmic microwave background radiation has a blackbody spectrum within 50 parts per million (ppm)*, confirming the Big Bang theory to extraordinary accuracy." - *NASA*

Harvard Public Affairs & Communications/Stephanie Mitchell/Harvard Staff Photographer

The Center for Astrophysics holds a news conference to release a major discovery regarding inflation. Marc Kamionskowski (from left), Clem Pryke, Jamie Bock, Chao-Lin Kuo, and John Kovac speak in the Philips Auditorium at the CFA at Harvard University (March 2014).

"Statistics suggest that they have a 99.9997 percent certainty of being correct."** – *National Geographic*

***Bibhas De comments*: History repeats!**

***I have shown this to be an outright fraud.**

****This is a patent absurdity. Their competitors should be able to blow this sky high.**

Question: What is the quality of a scientific community that repeatedly and authoritatively accepts these patent absurdities? This community has gone to seeds.

A world education message from www.bibhasde.com 03/19/14

BICEP2 and LIGO

The parallax view

	BICEP2	LIGO
"Discovered" what?	Gravitational wave	Gravitational wave
Waves from where?	Big Bang inflation era	Merging Binary Black Holes
Modus operandi	High math, high-tech	High math, high-tech
Grand rollout	17 March 2014	11 February 2016
Rollout venue	Harvard Press Conference	NSF Press Conference
Champagne corks popped?	Yes	Not publicly
Memorable quote	"Clear as day!"	"We did it!"
Who published?	Physical Review Letters	Physical Review Letters
Main institutional players	Harvard-Stanford-Caltech	Caltech-MIT
Observatory location	South Pole	Washington, Louisiana states
Head man	John Kovac	David Reitze
Spiritual gurus	Alan Guth, Andrei Linde	Kip Thorne, Rainer Weiss
TIME "Influential 100"	John Kovac (April 2014)	Kip Thorne (April 2016)
Major accolade	Kavli Prize	Breakthrough Prize
Nobel hopefuls	Guth, Linde	Thorne, Weiss
Establishment reception	Provisional acceptance	Total acceptance
US Congress	Resolution of praise introduced	Laudatory Hearing held
Praise from national leaders	...	Prez Obama, PM Modi, PM Sharif
Main funding source	Kavli Foundation	NSF
How much $$$?	Millions	A billion
Manpower/span	Dozens/years	A thousand/decades
Bibhas De said:	"Discovery scam"	"Total bullshit"
Why?	Quack instrument design	Botched instrument design
What did they observe?	Instrument projection on sky	Geomagnetic disturbance
Botch up science arena	Classical EM Theory	Classical EM Theory
Common bungling institution	Caltech	Caltech
What happened next	A cover up was executed	A cover up is underway
Who aided cover up?	Princeton, ESA, Kavli, Phys Rev Lett	Breakthrough Prize
Tie to COBE fraud	Relies on COBE "blackbody"	Weiss was a COBE guru
Society's bane	Science popularizers	Science popularizers
Final assessment	Cover up makes this a fraud	Cover up makes this a fraud

HISTORY LESSON: *"Civilizations die from suicide, not by murder."* Arnold J. Toynbee

A world education message from Bibhas De 05/03/2016